EPA/ROD/R04-99/020
1999

EPA Superfund
Record of Decision:

SAVANNAH RIVER SITE (USDOE)
EPA ID: SC1890008989
OU 31
AIKEN, SC
12/29/1998

Department of Energy
Savannah River Operation Office
P.O. Box A
Aiken, south Carolina 29802

Mr. K. A. Collinsworth, Manager
Federal Facility Agreement Section
Division of Site Assessment and Remediation
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Mr. J. L. Crane, Manager
SRS Remedial Project
Waste Management Division
United States Environmental Protection Agency, Region IV
61 Forsyth Street, SW
Atlanta, GA 30303

Dear Mr. Collinsworth and Mr. Crane:

SUBJECT: Submittal of the Record Copy of the Signed Interim Record Of Decision for the C-Area Burning/Rubble Pit (131-C), WSRC-RP-98-4039, Revision.1

Enclosed, please find a signed copy of the C-Area Burning/Rubble Pit Interim Record of Decision for your records. SRS will make the distribution of the Administrative Record file(s) and publish the notice of availability.

Please contact me at (803) 725-7032 if you have any questions.

Sincerely,

Brian T. Hennessey
Environmental Restoration Division
SRS Remedial Project Manager

BTH/HMH:kbs
OD-99-244
Enclosures

1. Interim Record of Decision for the C-Area Burning/Rubble Pit (131-C), WSRC-RP-98-4039, Revision. 1

MAR 30 1999

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SRS Administrative Record Files (Palmer, 730-2B, 1000)*
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United States Department of Energy

Savannah River Site

OU-31
Interim Record of Decision
Remedial Alternative Selection for the C-Area Burning/Rubble Pit Operable Unit (131-C)(U)

WSRC-RP-98-4039
Revision 1
September 1998

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808
Prepared for U.S. Department of Energy Under Contract No. DE-AC09-96SR18500

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U. S. Department of Energy
by
Westinghouse Savannah River Company
Aiken, South Carolina

INTERIM RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION (U)

C-Area Burning/Rubble Pit Operable Unit (131-C) (U)

WSRC-RP-98-4039
Revision 1
September 1998

Savannah River Site
Aiken, South Carolina

Prepared by:

Westinghouse Savannah River Company
for the
U.S. Department of Energy Under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

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DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

C-Area Burning/Rubble Pit Operable Unit 131 -C (CBRP)
Savannah River Site
Aiken, South Carolina

The CBRP source control and groundwater operable unit (OU) is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) (FFA 1993) for the Savannah River Site (SRS).

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for the CBRP located at the SRS in Aiken, South Carolina. The interim action was selected in accordance with CERCLA, as amended and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record File that includes all basis documents for this specific RCRA/CERCLA unit.

The proposed interim action will consist of a native soil over the CBRP pit and a vadose zone and groundwater treatment system. The treatment system will be operated and evaluated for approximately 1 year with incorporation of the results integrated into the final Corrective Measures Study/Feasibility Study (CMS/FS) which will include a detailed review of remediation technologies for the final remedial action. A complete description of the action is provided in the following sections.

This interim action, for the CBRP, is not a final action but is justified to minimize the impact of the CBRP on the Fourmile Branch watershed. It will be consistent with any planned future actions. A final Record of Decision (ROD) will follow additional study by SRS, regulator approval, and public involvement and will document the final CERCLA decision for the OU. Further, upon agreement among the U. S. Department of Energy (DOE), Environmental Protection Agency (EPA), and the South Carolina Department of Health and Environmental Control (SCDHEC), on the disposition of all source control and groundwater operable units within this watershed, a final comprehensive Record of Decision (ROD) for the watershed will be pursued with further public involvement.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the interim response action selected in this Interim Record of Decision (IROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

The DOE, EPA and SCDHEC have determined that an interim action principally designed to control the migration of high concentrations of solvents, in the saturated zone, is appropriate for the CBRP. Specifically, this interim action has two main objectives:

- Prevent direct contact with COC contaminated soils and reduce infiltration to minimize further migration of CMCOCs to the groundwater from soils within and beneath the CBRP; and

- Treat the area in the vicinity of the pit within the 25,000 ug/L VOC isoconcentration contour within the groundwater, with an objective to reduce concentrations and control the migration of VOCs within the 25,000 ug/L VOC contour.

The remedial action objectives for the interim action will be achieved by

- installing a soil cover over the source;
- performing soil vapor extraction (SVE) in the vadose zone beneath the pit; and
- performing air sparging (coupled with SVE) in the 25,000 ug/L contour of the groundwater plume

Specifically, the preferred alternatives for the Pit area at the CBRP OU are: Alternative S-3: Native Soil Cover and Alternative GW-3: In-Situ Air Sparging with Soil Vapor Extraction (AS/SVE). No final COCs were identified for the Mounded Area and soil adjacent to the Drainage Ditch, therefore, no alternatives were developed for these areas.

The Native Soil Cover will address surficial exposure to low level threat wastes (i.e., low concentration dioxin contamination in the near surface pit soil and organic contamination in the deep soil) in the pit area. The alternative will meet the soil Interim Remedial Action Objectives (IRAOs) to prevent direct contact with final constituents of concern (COCs) in contaminated soils and reduce infiltration to minimize further migration of contaminant migration COCs (CMCOC) to the groundwater from soils within and beneath the CBRP. As part of the final ROD, the native soil cover would be maintained and institutional controls will remain in place in perpetuity or until the waste no longer poses a threat to human health or the environment.

AS/SVE will address principal threat wastes (i.e., highly concentrated TCE in the aquifer sediments immediately adjacent to the pit in the upper zone of the water table aquifer) and VOC vadose zone contamination. AS/SVE will meet the groundwater IRAOs to treat the principal threat area in the vicinity of the pit, within the 25,000 ug/L VOC isoconcentration contour, with an objective to reduce concentrations and control the migration of VOCs within the 25,000 ug/L VOC contour.

Implementation of the preferred alternatives will require both near- and long-term actions. For the near term, surface and subsurface soil contamination will be addressed by the installation of a native soil cover over the CBRP source unit. The soil cover will be compacted to reduce infiltration, sloped to promote runoff, and will have a layer of vegetation to prevent erosion. The soil cover will prevent future contact by workers, residents, and ecological receptors with the dioxin contamination in the soil. The soil cover will also minimize further migration of contaminants from the soil to the groundwater by reducing infiltration. In addition to continued inspection and maintenance of the cover, signs will be posted at the CBRP to indicate that the area was used for the disposal of hazardous substances and existing SRS access controls will be used to maintain the site for industrial use only.

Over a longer period of time, groundwater contamination will be addressed through controlled sparging of air into the groundwater. The injected air will volatilize the organic compounds in the groundwater that will move into the vadose zone and also volatilize the organic contaminants in the deep soil. Organic vapors from both the groundwater and deep soil will be extracted from the soil above the shallow groundwater aquifer using vacuum wells connected to a soil vapor extraction (SVE) system. The extracted soil vapors will be processed through a liquid-phase separator to remove condensate. The offgas will then either be released into the atmosphere or treated to meet release requirements. Until the IRAOs are achieved, groundwater monitoring will be performed.

The CBRP Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan (CMI/RD/RDR/RAWP) post-IROD document was submitted to the regulatory agencies on June 19, 1998. The CMI/RD/RDR/RAWP details the actions to be taken for implementing the soil cover and AS/SVE remedies including a summary description of the scope of work for the remedial action design, monitoring requirements, a detailed implementation/submittal schedule for subsequent post-IROD documents, and an anticipated field activities start date.

Statutory Determinations

This interim action is protective of human health, and the environment and will reduce the principal threats posed by the CBRP. Relative to its overall effectiveness with respect to the nine selection criteria established by the NCP, the selected alternatives are cost effective. This interim action will not identify final remedial goals; but the selected interim alternatives are consistent with the interim remedial action objectives and any final action. Pursuant to the EPA IROD guidance (EPA 1989) and checklists, the alternative selection focused upon the key ARARs listed below which apply to the limited scope of the interim action. The alternative selection also considered final action ARARs to ensure the interim action is compatible. The final action will comply with Federal and State applicable or relevant and appropriate requirements. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is a furtherance of that statutory mandate.

- Fugitive Particulate Emissions (40 CFR 50.6 and SC R61-62.6, Section III)
- SC Toxic Air Pollutant regulations (SC R61-62.1, Section II, paragraph 3)
- SC Well Construction regulations (SC R61-71)

Because this action does not constitute the final remedy for the CBRP, the statutory preference of remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to fully address the threats posed by the conditions at the CBRP. This interim action is not designed or expected to be a final action for the groundwater, but the selected remedy represents the best balance of tradeoffs among alternatives with respect of pertinent criteria, given the limited scope of the action. The soil cover will likely be acceptable for the final action for soils at the unit.

SCHWMR R.61-79.124 and Section 117(a) of CERCLA, as amended, require advertisement of the draft permit modification and the proposed plan, respectively. Because this is an interim remedial action, a permit modification is not required to be included with this IROD. A final permit modification will include the final selection of remedial alternatives under RCRA, will be sought for the entire CBRP OU with the final SB/PP and will include the necessary public involvement and regulatory approvals. This IROD also satisfies the RCRA requirements for an Interim Measures Work Plan.

Section 300.430 (f)(4)(ii) of the National Oil and Hazardous Substances Contingency Plan (NCP) requires that a five year review of a ROD be performed if hazardous substances, pollutants, or contaminants remain in the waste unit. The SRS RCRA permit (SRS 1995 RCRA Renewal Permit, SCI 890 008 989) is reviewed every five years and was most recently reviewed on September 5, 1995. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within 5 years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be ongoing as SRS continues to develop final remedial alternatives for the CBRP.

9/23/98
Date

Thomas F. Heenan
Assistant Manager for Environmental Quality
U. S. Department of Energy, Savannah River Operations Office

12/23/98
Date

Richard D. Green
Division Director
Waste Management Division
U. S. Environmental Protection Agency - Region IV.

3/[illegible]/99
Date

R. Lewis Shaw
Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

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INTERIM DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

C-Area Burning/Rubble Pit Operable Unit (131-C) (U)

WSRC-RP-98-4039

Revision 1

September 1998

Savannah River Site

Aiken, South Carolina

Prepared by:

Westinghouse Savannah River Company
for the
U.S. Department of Energy Under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
AS	Air Sparging
AS/SVE	In-Situ Air Sparging/Soil Vapor Extraction
bls	below land surface
BRA	Baseline Risk Assessment
CBRP	C-Area Burning/Rubble Pit Operable Unit (131-C)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CMCOC	contaminant migration constituent of concern
CMI/RD/RDR/ RAWP	Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan
CMS/FS	Corrective Measures Study/Feasibility Study
COC	constituent of concern
COPC	constituent of potential concern
CPT	cone penetrometer technology
CRSB	C-Reactor Seepage Basin
CSM	conceptual site model
DOE	U. S. Department of Energy
DQO	data quality objective
EPA	U. S. Environmental Protection Agency
FFA	Federal Facility Agreement
FR	Federal Register
Ft	Feet
HpCDD	1,2,3,4,6,7,8 heptachlorodibenzo-p-dioxin
HQ	Hazard Quotient
IAPP	Interim Action Proposed Plan
IRAOs	Interim Remedial Action Objectives
IROD	Interim Record of Decision
M	Meters
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Contingency Plan
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OCDD	octachlorodibenzo-p-dioxin

I. SAVANNAH RIVER SITE AND OPERABLE UNIT NAME, LOCATION, DESCRIPTION, AND PROCESS HISTORY

Savannah River Site Location, Description, and Process History

The Savannah River Site (SRS) occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of western South Carolina. SRS is a secured U.S. Government facility with no permanent residents and is located approximately 25 miles southeast of Augusta, Georgia, and 20 miles south of Aiken, South Carolina (Figure 1).

The Savannah River Site is owned by the U.S. Department of Energy (DOE). SRS has historically produced tritium, plutonium, and other special nuclear materials for national defense and the space program. Chemical and radioactive wastes are by products of nuclear material production processes.

Operable Unit Name, Location, Description, and Process History

The Federal Facility Agreement (FFA) (FFA 1993) for the SRS lists the C-Area Burning/Rubble Pit (CBRP), 131-C, as a Resource Conservation and Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unit. Consequently, the unit requires further evaluation, using an investigation/assessment process that integrates and combines the RCRA Facility Investigation (RFI) process with the CERCLA Remedial Investigation (RI), to determine the actual or potential impact to human health and the environment.

DOE is issuing this Interim Record of Decision (IROD). The DOE functions as the lead agency for SRS remedial activities, with concurrence by the U.S. Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). The purpose of this IROD is to document the preferred interim remedial actions for the CBRP which will consist of a native soil cover over the CBRP pit and a vadose zone and groundwater treatment system. The cover and treatment system are detailed in Section IX.

The CBRP is located in the central part of SRS. It is west of C-Area Reactor and north of Road A-7. Adjacent to the road, there is a concrete Drainage Ditch. CBRP is in the Fourmile Branch watershed on a ridge between two unnamed tributaries of Fourmile Branch. At its closest point, one tributary is approximately 900 feet away.

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Figure 1. Map of Savannah River Site Showing the Location of C-Area Burning/Rubble Pit

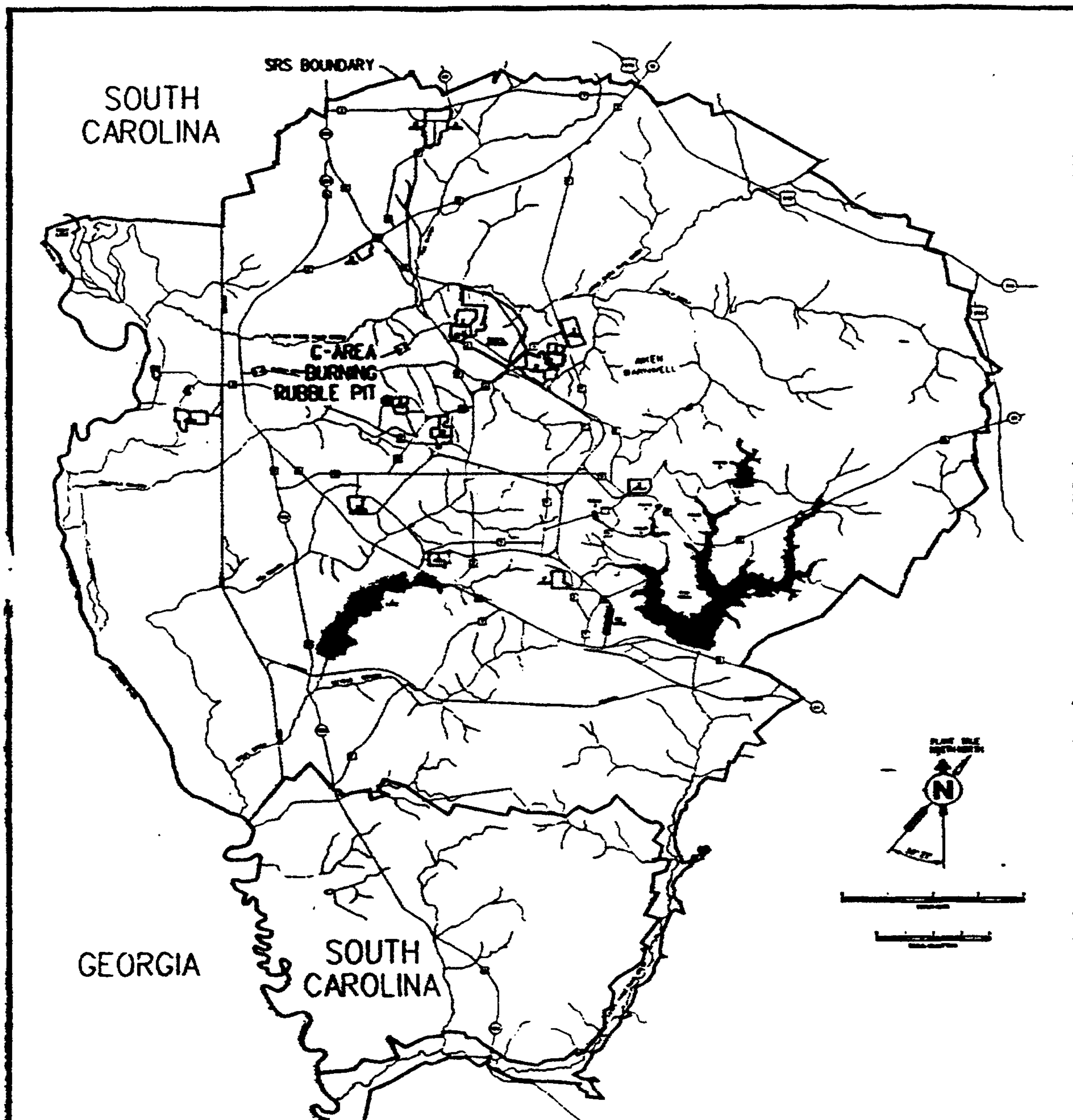


Figure 1. Map of Savannah River Site Showing the Location of the CBRP

Fourmile Branch stream is located approximately 3,200 feet northwest of the CBRP and discharges into the Savannah River floodplain and associated swamps. Figure 1 shows the location of the CBRP in relation to other facilities at SRS. Figure 2 shows the location of the CBRP in relation to C-Area reactor.

The CBRP was a shallow, unlined excavation (approximately 25 feet wide and 350 feet long) with depths of approximately 8 to 12 feet. It had a volume of approximately 3,240 cubic yards. The CBRP was constructed in 1951 for use as a burning pit. During the operation of the pit, it served as a repository for organic materials (i.e., waste oils, wood, paper, plastics, and rubber) of unknown use or origin. Disposal records, including the chemical composition, origin, use and volume of the disposedwastes, were not kept for this unit during its period of operation. Disposal of combustible wastes in the pit was discontinued in 1973. At that time, the pit contents were covered with a thin layer of soil. The pit was then used for the disposal of inert rubble and, when full, was backfilled with soil and sediments to grade level. The pit is presently inactive (WSRC 1997a).

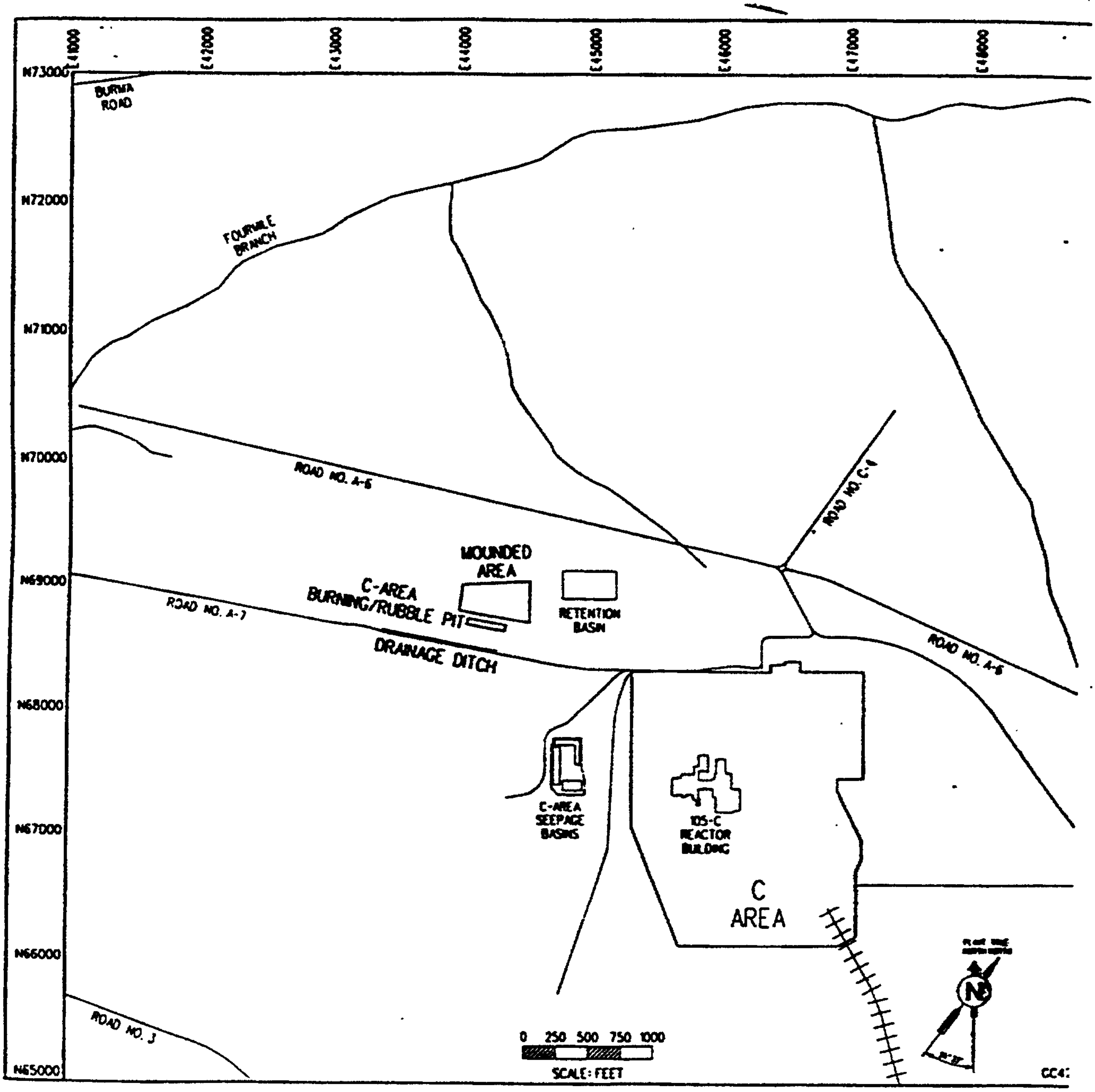
A Mounded Area, approximately 30 feet high, 270 feet wide, and 525 feet long, is located directly north of the CBRP. This man-made mound contains soil and debris from the initial construction of the C-Area Reactor. It is covered with native soils excavated to construct a large retention basin to the cast of the CBRP. This Mounded Area was not used for burning, and no known hazardous materials were disposed in this area. A Drainage Ditch occurs to the south of the pit, paralleling Road A-7.

II SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational History

The primary mission of SRS was to produce tritium, plutonium-239, and other special nuclear materials for U.S. defense programs. Production of nuclear materials for the defense programs was discontinued in 1988. SRS has provided nuclear materials for the space program as well as for medical, industrial, and research efforts to the present. Chemical and radioactive wastes are byproducts of nuclear material production processes. These wastes have been treated, stored, and in some cases, disposed at SRS. Past disposal practices have resulted in soil and groundwater contamination.

Figure 2. Location of C-Area Burning/Rubble Pit



SRS Compliance History

Waste materials handled at SRS are regulated and managed under RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities have required federal operating or post-closure permits under RCRA. SRS received a hazardous waste permit from the SCDHEC; the permit was most recently renewed on September 5, 1995. Part IV of the permit mandates corrective action requirements for nonregulated solid waste management units subject to the requirements specified in Section 3004(u) of RCRA.

On December 21, 1989, SRS was included on the National Priorities List (NPL). This inclusion created a need to integrate the established RFI Program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA, DOE has negotiated a FFA (FFA, 1993) with EPA and SCDHEC to coordinate remedial activities at SRS into a single comprehensive strategy which fulfills these dual regulatory requirements.

Operable Unit Compliance History

As previously stated the CBRP is listed in the FFA as a RCRA/CERCLA unit requiring further evaluation to determine the actual or potential impact to human health and the environment. An RFI/RI characterization and a Baseline Risk Assessment (BRA) were conducted for the unit between 1994 and 1997 and the results presented in the RFI/RI/BRA report. The RFI/RI/BRA, Rev. 1.1 (WSRC 1997a) report was submitted in accordance with the FFA and the approved implementation schedule in December 1997. A final revision (Rev 1.3) is scheduled for submittal in April 1999. Sufficient data has been collected to identify a high concentration (hot spot) source of contamination under and adjacent the CBRP. Per EPA guidance, on presumptive response strategies for groundwater (EPA 1996), groundwater response actions should be implemented in a phased approach with provisions for monitoring and evaluating their performance. Subsequently, SRS developed an SRS Early Action Strategy (10/21/97). Consistent with this EPA guidance and SRS's Early Action strategy, a CBRP interim action is documented herein to install a soil cover and an In-Situ Air Sparging/Soil Vapor Extraction (AS/SVE) system to remove principal threat wastes (i.e., high concentrations of trichloroethylene (TCE)).

An Interim Action Proposed Plan (IAPP) (WSRC 1998a) was submitted in accordance with the FFA and the approved implementation schedule, and was approved by EPA and SCDHEC in April 1998. A presentation was made to the Citizens Advisory Board at an open public meeting in May 1998, and the public comment period ended in May 1998. The implementation of this interim action will be conducted concurrently with the pursuit of a final remedial action.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Both RCRA and CERCLA require that the public be given an opportunity to review and comment on the draft permit modification and proposed remedial altemative. Public participation requirements are listed in South Carolina HazardousWaste Management Regulation (SCHWMR) R.61-79.124 and Sections 113 and 117 of CERCLA. These requirements include establishment of an Administrative Record File that documents the investigation and selection of the remedial alternatives for addressing the CBRP soils and groundwater. The Administrative Record File must be established at or near the facility at issue.

The SRS Public Involvement Plan (DOE 1994) is designed to facilitatepublic involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS Public Involvement Plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act, (NEPA 1969). The *IAPP for the C-Area Burning/Rubble Pit (131-C)* (WSRC 1998a), which is pan of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the CBRP.

The FFA Administrative Record File, which contains the information pertaining to the selection of the response action, is available at the Atlanta EPA office and at the following locations:

U.S. Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina-Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, South Carolina 29208
(803) 777-4866

Similar information is available through the repositories listed below:

Reese Library
Augusta State University
2500 Walton Way
Augusta, Georgia 30910
(706) 737-1744

Asa H. Gordon Library
Savannah State University
Tompkins Road
Savannah, Georgia 31404
(912) 356-2183

SCHWMR R 61-79.124 and Section 117(a) of CERCLA, as amended, require advertisement of the draft permit modification and any proposed remedial or interim action and an opportunity for the public to participate in the selection of a remedial or interim action. Because this is an interim remedial action, a permit modification is not required to be included with this IROD. The final permit modification will (1) include the final selection of remedial alternatives under RCRA, (2) be sought for the entire CBRP Operable Unit with the final Statement of Basis/Proposed Plan (SB/PP) and (3) will include the necessary public involvement and regulatory approvals. This IROD also satisfies the RCRA requirements for an Interim Measures Work Plan.

The RCRA Administrative Record File for SCDHEC is available for review by the public at the following locations:

The South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
8901 Farrow Road
Columbia, South Carolina 29203
(803) 896-4000

Lower Savannah District Environmental Quality Control Office
215 Beaufort Street, Northeast
Aiken, South Carolina 29802
(803) 648-9561

The public was notified of the public comment period through mailings of the *SRS Environmental Bulletin*, a newsletter sent to citizens in South Carolina and Georgia, and through notices in the *Aiken Standard, the Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnswell People-Sentinel*, and *The State* newspapers. The public comment period was also announced on local radio stations.

The IAPP 30-day public comment period began on 4/17/98 and ended on 5/16/99. The IAPPwas presented to the Citizen Advisory Board in an open public meeting on 5/6/98. A Responsiveness Summary was prepared to address comments received during the public comment period and the open public meeting on 5/6/98. The Responsiveness Summary is provided in Appendix A of this Interim Record of Decision (IROD). It will also be available in the final RCRA permit

IV SCOPE AND ROLE OF THE OPERABLE UNIT WITHIN THE SITE STRATEGY

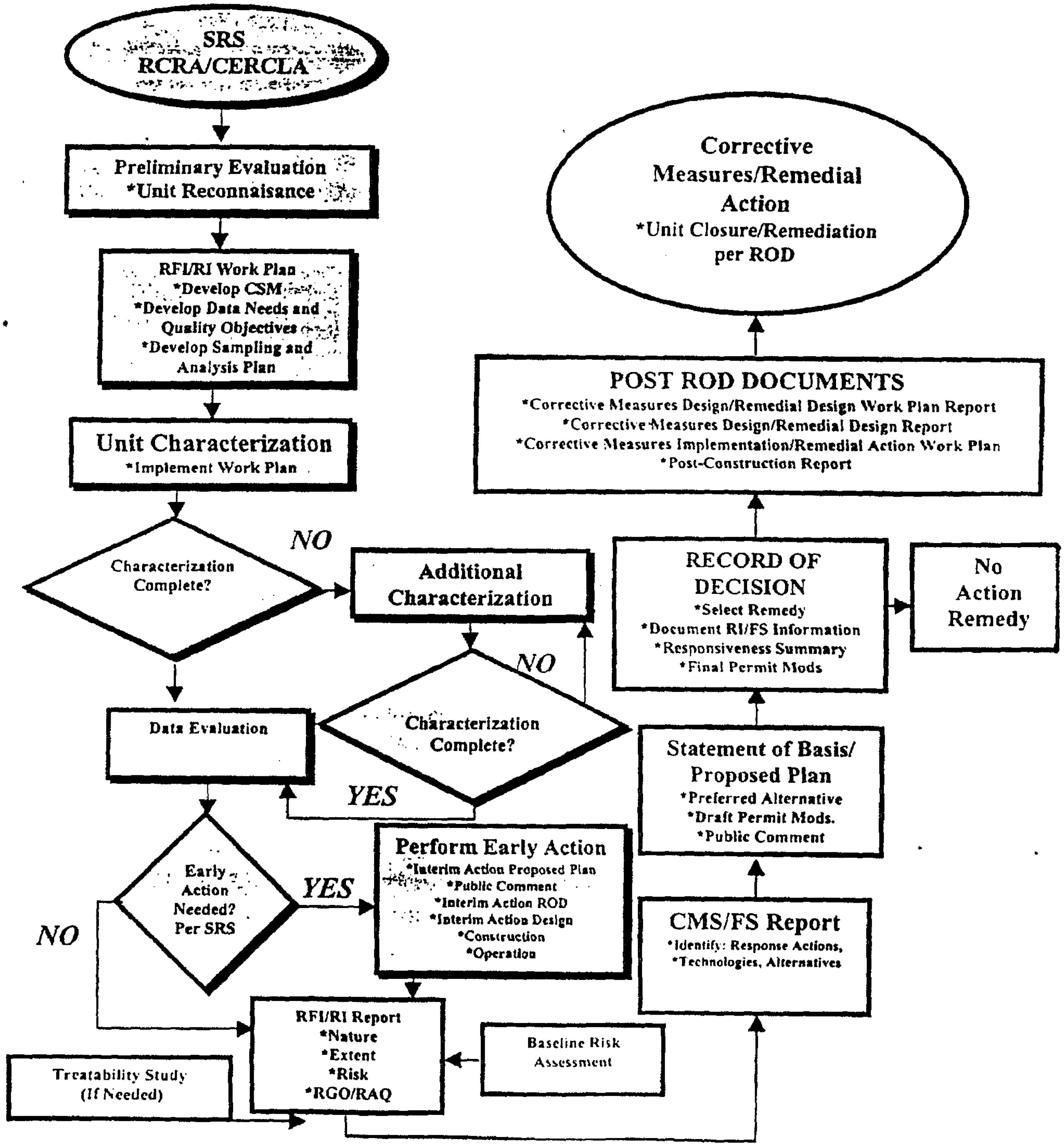
RCRA/CERCLA Programs at SRS

RCRA/CERCLA units (including the CBRP) at SRS are subject to a multi-phase remedial investigation process that integrates the requirements of RCRA and CERCLA as outlined in the RFI/RI Program Plan (WSRC 1993). The RCRA/CERCLA processes aregenetically summarized in Figure 3. Figure 3 is consistent with the SRS ER RI/FS Early Action Strategy (10/21/97) which was developed with regulatory concurrence.

The generic phases include (1) the investigation and characterization of potentially impacted environmental media (such as soil, groundwater, and surface water) comprising the waste-site and surrounding areas; (2) the evaluation of risk to human health and to the local ecological community; (3) the screening of possible remedial actions to identify the selected technology which will protect human health and the environment; (4) implementation of the selected alternative; (5) documentation that the remediation has been performed competently; and (6) the evaluation of the effectiveness of the technology. The steps of this process are iterative in nature, and include decision points which involve concurrence among the DOE (as owner/manager), the EPA and SCDHEC (as regulatory oversight), and the public.

As outlined in Figure 3, and consistent with the above generic phases, the overall strategy for addressing the CBRP is to (1) perform a RF/RI to characterize the waste unit that will identify the nature and extent of contamination and the media of concern; (2) perform a baseline risk assessment (BRA) to evaluate media of concern, constituents of concern (COC), exposure pathways and characterize potential risks; (3) evaluate the possible remedial alternatives and acquire community involvement in the remedial selection and document the process in the Corrective Measures Study/Feasibility Study (CMS/FS) and Proposed Plan (PP); and (4) evaluate and perform a final action to remediate, as needed, the identified media.

Figure 3. RCRA/CERCLA Logic and Documentation for the CBRP Interim Action



The interim action described in this MOD was developed and planned concurrently with RFM process. Figure 3 illustrates the general decisions related to the recognition that an early action was appropriate. The following sections succinctly describe the steps of the RFM process. To date, the interim action has progressed through the shaded areas of Figure 3 concluding with the "Perform Early Action" block.

RFI/RI Work Plan

Based on the data reviewed and collected during the unit preliminary screening and process knowledge, a conceptual site model (CSM) was developed to determine the contaminated media sources release mechanisms, migration pathways, exposure routes, and potential human and ecological receptors. Section V provides the unit-specific CSM for the CBRP OU and a summary of the characteristics of the primary and secondary sources and release mechanisms for the units, consistent with RFMU Work Plan. The approved RFLW Work Plan for the CBRP (WSRC 1994, WSRC 1998b) outlined the specific characterization activities for the CBRP.

Unit/Site Characterization (RFI/RI)

The primary need for the RFMU unit characterization is to establish unit-specific constituents (USCs) that pose potential risk through various exposure routes and detennine their distribution in source media associated with the unit. These characterization data provide the contaminant profile and mass information necessary to determine the potential for contaminant migration to off-unit receptors. Even though characterization activities are ongoing at CBRP, a good general understanding of the containimfion is available. For a more complete discussion 'of the present characterization, see Section V, and the latest revision to the RFMUMRA (WSRC 1997a).

Baseline Risk Assessment

The intent of the BRA is to develop risk information necessary to assist in the decision-making process for vemedial sites. Because characterization is ongoing, a final risk assessment has not been completed. However, risk can be quantified based upon known data, coupled with potential scenarios for current and future human and ecological receptors through multiple exposure routes as identified in the CSM. A summary of the preliminary findings of the latest revision of the BRA (WSRC 1997a) for the CBRP are presented in more detail in Section VI.

Preliminary Alternatives Analysis (PAA)

A Preliminary Alternative Analysis (PAA) was conducted to support the development of a Corrective Measures Study/Feasibility Study (CMS/FS) for the CBRP, which will be submitted in early 2001. The preliminary alternative analysis was developed to eventually document the alternative selection process for a final remedial remedy. Consequently, the preliminary alternative analysis is very complete with respect to the range of alternatives and their consistency with final alternatives. The 1APP used the PAA as a basis for selecting appropriate interim action alternatives for CBRP contaminated soil and groundwater. A summary of the results of the PAA conducted for the CBRP is provided in Section VII, and a summary of the comparative analysis of the alternatives is provided in more detail in Section VIII.

Interim Action Proposed Plan (IAPP)

T'he culmination of the interim response action selection process is the Interim Action Proposed Plan (IAPP). The purpose of die IAPP is to facilitate public participation in the remedy selection process through the solicitation of public review, and comment on all the remedial alternatives described. The 1APP describes all remedial options that were considered in detail in the PAA and explicitly identifies DOE's preliminary preferred alternative(s) for remedial action and the rationale for the selection. The IAPP was subsequently approved by the regulatory agencies. The basis for the selection and additional design and operational details for the approved remedy are provided in Section IX.

Interim Record of Decision

The Interim Record of Decision (IROD) documentsthe interim remedial action plan for a unit and consists of three basic components: a Declaration, the Decision Summary, and the Responsiveness Summary. The purpose of the Declaration is to certify that the remedy selection process was carried out in accordance with the requirements of CERCLA and, to the extent practicable, the NCP.

The Decision Summary is a technical and information document that provides the public with a consolidated source of information about the history, characteristics, and risks posed by a unit, followed by a summary evaluation of the cleanup alternatives considered. The Responsiveness Summary presents comments received during the public comment period (4/17/98 through 5/16/98) on the LAPP and a response to each comment or criticism, whether submitted in writing or orally. The Responsiveness Summary for the CBRP is provided in Appendix A and an explanation of significant changes resulting from public comment is provided in Section XI.

Records of Decision are typically accompanied with RCRA Permit modifications for SRS waste units. SRS has a hazardous waste permit firom SCDHEC (SRS 1995 RCRA Renewal Peirmit, SCI 890 008 989), which includes all SRS RCRA waste units and is renewed every five years. Ile final ROD for the CBRP will include a RCRA permit modification.

IROD Documentation

The post-IROD documentation consists primarily of the design documents required prior to initiating a remedial action. Specific post-IROD documents include the Corrective Measure Implementation/Remedial Design/Remedial Design Report/ Remedial Action Work Plan, andthe Post-Construction Report. A discussion of the schedules that apply to these docurnents is provided in the IAPP and Section XIII of this IROD.

C-Area Interim Remedial Strategy

The CBRP is one of the OUs located within the Fourmile Branch watershed(Figure 2). Several source units within this watershed will be evaluated to determine impacts, if any, to associated streams and wetlands. It is the intent of SRS, EPA, and the SCDHEC to manage these sources of contamination to minimize impact to the watershed.

During the CBRP characterization process, it was recognized that the highest concentrations of contaminants and the contaminants with the highest risk were primarily associated with volatile organic compound (VOC groundwater contamination. However, it was also recognized that the full extent of the groundwater contamination had not been completely characterized during the latest revision of the RCRA Facility Investigation/Remedial Investigation (RFI/RI). Further, tritium groundwater contamination has also been identified in die vicinity of the CBRP but appears to be source from the C-Area Reactor Seepage Basin based on historical groundwater monitoring of the C-Area Reactor Seepage Basin and the latest revision of the CBRPRFI/RI/BRA. Due to the complexity of this unit and the current uncertainties with the hydrogeology (known tritium and VOC plumes), further characterization will be conducted concurrently with this interim action. In addition to the groundwater characterization activities the potential impact to Fourmile Branch and Twin Lakes surface water and sediments from the current release of twit contaminants is being investigated. The characterization results associated with the CBRP will be included in the final RFI/RI/BRA Report.

Concurrent with the final RFI/RI/BRA and final remedial selection remedial process, an interim action is planned and is the subject of this document. The interim action is concordant with the SRS Early Action Strategy (10/21/97), regulatoryguidance on presumptive response strategies for groundwater (EPA 1996), and a preference for treatment of principal threat waste.

The interim action will include the installation of an AS/SVE treatment system. The system will be operated and evaluated for approximately 1 year with incorporation of the results into the final Corrective Measures Study/Feasibility Study (CMS/FS) which will include a detailed review of remediation technologies for the final .remedial action. A native soil cover will also be installed to act as a barrier to prevent soil exposure to future human and ecological receptors and will also reduce precipitation infiltration to minimize the further migration of TCE from the CBRP soils to the groundwater.

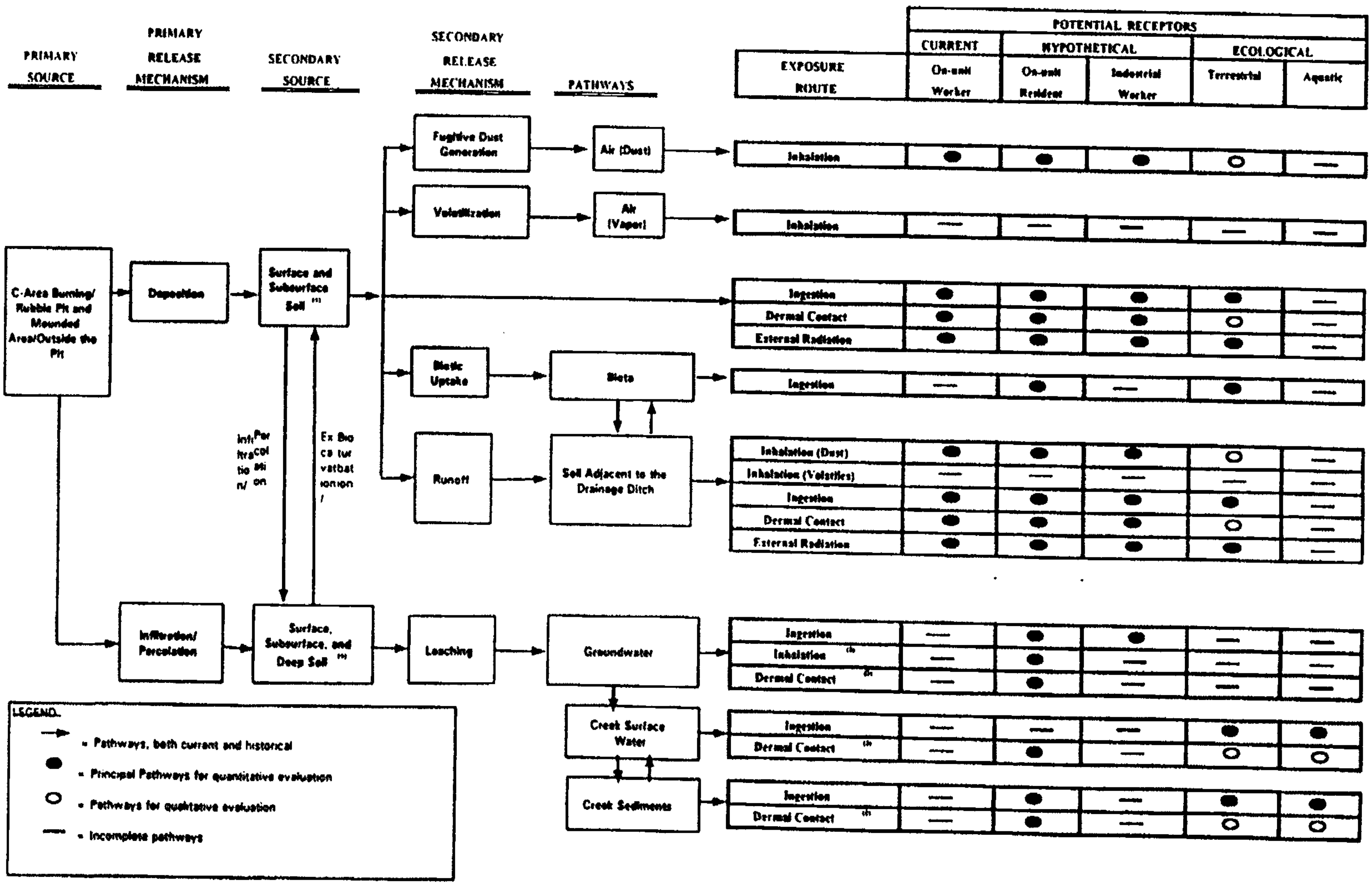
This interim action for the CBRP is not a final action but will be pursued to minimize the impact of the CBRP on the Fourmile Branch watershed. The interim action with however be consistent with any planned future action. A final ROD will follow additional study by SRS, regulator approval, and public involvement and with document the final remedial decision for the OU. Further, upon agreement between die DOE, EPA, and SCDHEC, on the disposition of all source control and groundwater operable units within this watershed, a final comprehensive ROD for the watershed will be pursued with further public involvement.

V. INTERIM ACTION OPERABLE UNIT CHARACTERISTISCS

A CSM was developed for the CBRP that identifies the primary sources, primary contaminated media, migration pathways, exposure pathways, and potential receptors. The CSM for the CBRP is presented in Figure 4 and is based on the data presented in the RCRA/CERCLA documentation for these units and the latest characterization data.

The Data Summary Reports (WSRC 1996, WSRC 1997b, WSRC 1997c) and the latest revision of the RFI/RI/BRA Report (WSRC1997a) contain detailed analytical data and interpretation of environmental impact for all media samples taken in the characterization of the CBRP. The RFI/RI/BRA also includes the specific

Figure 4. Revised Conceptual Site Model for the CBRP



(1) Subsurface soil evaluated for future receptors only

(2) Showering scenario includes both inhalation and dermal contact pathways

methodologies for determining: Unit Specific Constituents (USCs) for nature and extent evaluations; Preliminary Contaminant Migration Constituents of Concern (CMCOCs) important for contaminant migration evaluations. preliminary Constituents of Concern (COCs) for human health and ecological risk evaluations; and final COCs. The data summary reports and RFI/RI/BRA are available in the Administrative Record File (See Section III).

The following sections provide a detailed discussion of the primary and secondary sources and release mechanisms, the nature of contamination, and the extent of contamination in the vicinity of the pit. Section VI provides a detailed discussion of operable unit risks.

Primary Sources and Release Mechanisms

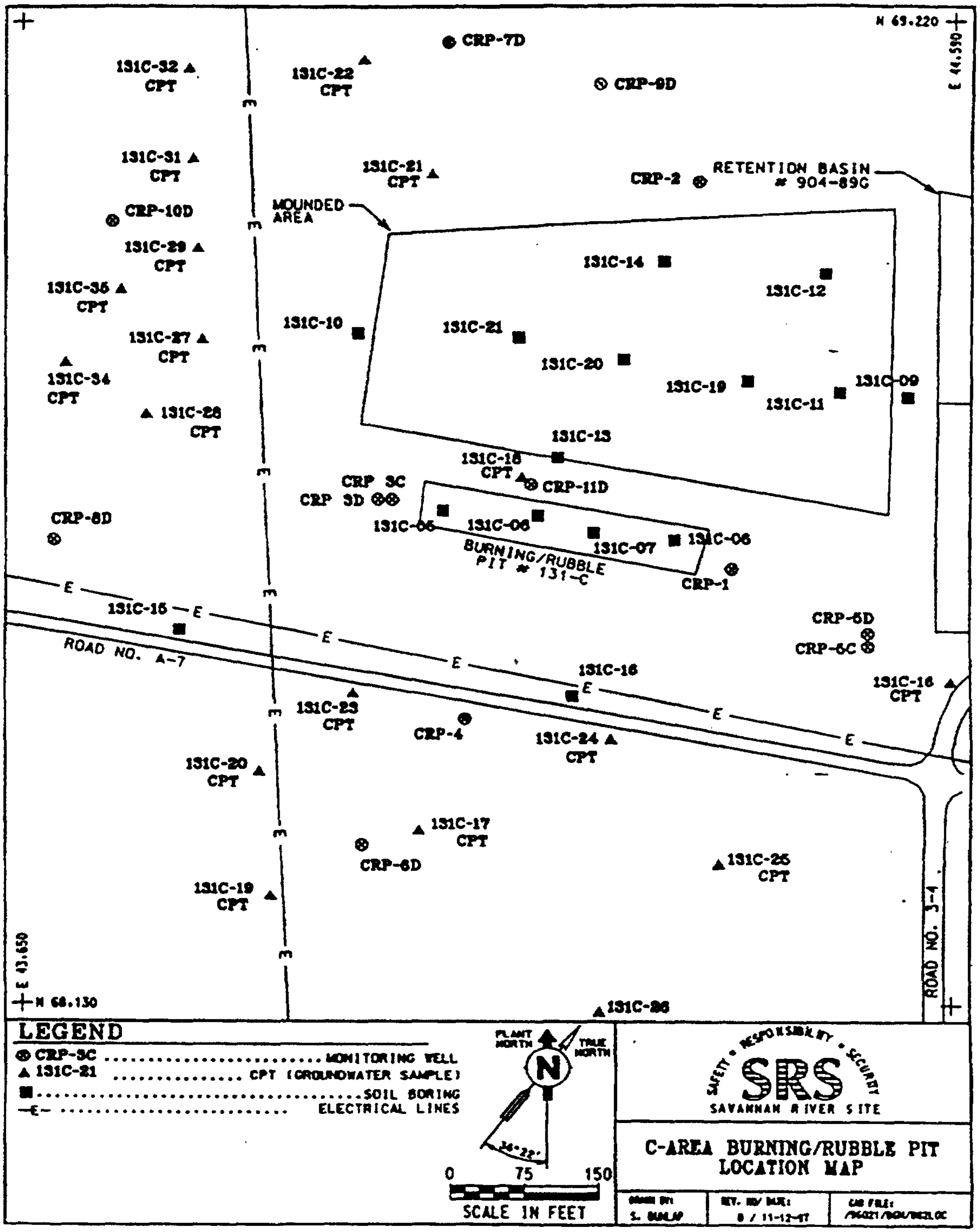
The primary sources were organic liquids of unknown use and origin, waste oils, paper, plastics, and rubber disposed in the pit during its operational history. Residual liquids are no longer present and the CBRP has been filled to grade with native soils. The primary release mechanisms arc deposition inside the CBRP and infiltration/percolation to surface, subsurface and deep soil. There are no documented occurrences of CBRP overflow. Disposal records, including composition, origin, and use of materials disposed were not kept for this unit during its period of operation. These disposed materials are consistent with the constituents identified in pit samples and visual observations made during the investigation.

Secondary Sources and Release Mechanisms

Secondary sourcesinclude surface and subsurface soil in the Pit Area. As illustrated in Figure 4, secondary release mechanisms associated with these sources include volatilization from soil and water within the pit, fugitive dust generation from exposed surface soil, biotic uptake, runoff and leaching to groundwater.

A detailed sampling and analysis plan was prepared and implemented to investigate these secondary Sources. The field investigations conducted from September 1994 to July 1997 included soil, groundwater, and associated background sampling activities and provided data on the nature and extent of constituents present in soils and groundwater. Soil and groundwater sample locations are illustrated in Figure 5. The sample analysis information was grouped into Pit Area Soil and Groundwater (upper zone of the water table aquifer, and lower zone of the water table aquifer). These characterization results are summarized below.

Figure 5. CBRP Groundwater and Soil Sampling Locations



Pit Area Soil

To evaluate the potential effect of runoff from the CBRP, soil samples were collected from soil adjacent to the Drainage Ditch that parallels Road A-7 (See Figure 2). No significant contamination was identified in the Mounded Area or the soil adjacent to the Drainage Ditch in the vicinity of the CBRP. Within the Pit Area, three soil intervals were selected for analysis: the upper I foot (surface soil), the uppermost 4 feet (subsurface soil), and from the surface to the depth of the deepest soil boring (all depths). The conclusions of these analyses indicate soils within and beneath the pit are primarily contaminated with VOCs (principally TCE) and low concentrations of dioxins and metals. A complete discussion of the final COCs for soils is provided in Section VI.

The pit contains a total of approximately 1,300 cubic yards of soils that are contaminated with varying concentrations of VOCs, dioxins and metals. However, characterization data indicates that the western half of the pit (approximately 650 cubic yards) is the area of highest TCE contamination. The maximum concentration of TCE identified within the pit soils is 4.01 ug/L. Ile maximum concentration of TCE identified in soils beneath the western portion of the pit is 286 ug/L.

The presence of TCE at higher concentration in the soils beneath the pit (compared to pit soils) indicates that sampling did not intercept the highest concentration of TCE in pit soils. This situation is not unusual in highly heterogeneous waste units like burning rubble pits. The presence of relatively high concentrations of TCE in the vadose zone soils indicates that these soils may be a source of contaminants to the groundwater and should be considered in contaminant migration modeling and probably the alternatives analysis. Because concentrations of TCE in the vadose zone are likely to be highly variable it is difficult to estimate a volume of TCE laden soils within the vadose zone.

Groundwater

The water table in the C Reactor Area can be subdivided into the upper and lower water table. The lower water table is separated from the upper water table by a thin discontinuous stratigraphic unit of interbedded sands and clayey sands. The upper water table in the vicinity of the CBRP is located approximately 60 feet below the land surface and is approximately 20 feet thick. Sediments of the upper water table consist principally of interbedded sand, silty sands, and clayey sands. The lower water table aquifer consists principally of less muddy sands with higher potential rates of water flow (higher hydraulic permeabilities).

Based on the results of seven groundwater sampling events between December 1995 and July 1997, several constituents in the lower zone and the upper zone of the water table aquifer had a maximum concentration greater gun two times the average background concentration or equivalent to the Maximum Contaminant Level (MCL). A complete list of these constituents are provided in the RFI/RI/BRA (WSRC 1997a). The characterization of the groundwater in the vicinity of the pit indicates that the principal contaminants are PCE, TCE and tritium.

Figure 6 illustrates the contour of the TCE plume in the upper zone of the water table aquifer based on known well and Cone Penetrometer Techniques (CPT) data collected after the latest revision of the RFI/RI/BRA. The extent of the plume to the northwest has not been fully characterized but is estimated based on hydraulic conductivity and the groundwater gradients of the area. Assuming an average porosity of 0.2, the volume of impacted groundwater depicted in Figure 6 is estimated to be 6.0 X 10^7 gallons.

Among the contaminants in the upper zone of the water table aquifer, TCE is the most pervasive. It was measured at a concentration of 1,660 ug/L in a monitoring well adjacent to the pit, and at concentrations as high as 130,000 ug,/L in CPT sampling locations adjacent to the pit. The CPT data m the upper zone of the water aquifer indicates that maximum TCE concentrations are high enough to suggest a high probability of free phase (undissolved) TCE in the upper water table aquifer. The ftee phase is likely present in the form of micro-droplets within the pore spaces of the aquifer. In addition, the free phase TCE can be absorbed onto aquifer particles.

Although the downgradient extent has not been completely defined, sufficient data has however, been collected identifying the hot spot source of contamination (e. g, >25,000 ug/L VOC). The volume of impacted >25,DDO ug/L VOC groundwater is estimated to be 3.0 X 10^6 gallons. The hot spot source is driving an interim action while characterization is finalized for the selection of a final ROD. The low concentrations of TCE measured downgradient in the lower water table aquifer well, in the vicinity of the pit, suggest that TCE has not migrated into the lower zone of the water table aquifer.

The presence of a TCE plume beneath the CBRP is consistent with the soil sampling results. The presence of TCE indicated by the elevated concentration in the vadose zone beneath the pit (at approximately 30 feet bls) indicates a continuing potential source for TCE to migrate to the groundwater. Characterization information on the groundwater VOC hotspot and distal plume is summarized as follows:

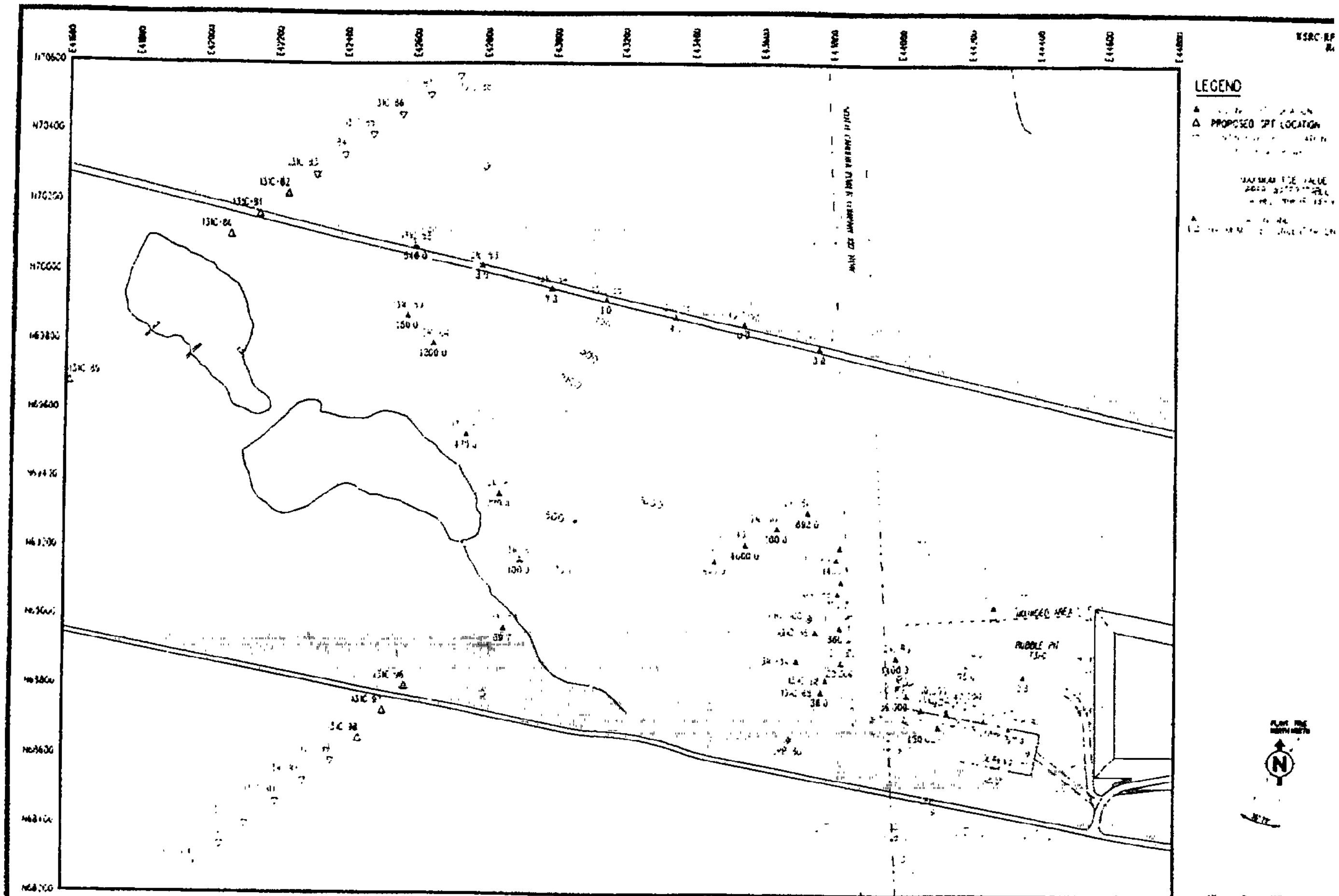


FIGURE 6 C AREA BURNING RUBBLE PIT TCE PLUME CONTOUR MAP

- Groundwaterin the upper water table is contaminated with high concentrations of TCE, and lesser amounts of tetrachlorocthylene (PCE), dichloromethane and tritium. TCE concentrations are high enough to suggest a high probability of free-phase (undissolved) TCE in the upper water table.

- Figure 6 illustrates the distribution of TCE emanating from the Pit Area. The high concentrations are consistent with the presence of elevated TCE concentrations in vadose zone soils beneath the pit, as described above.

- High groundwater WE concentrations compared to the vadose zone maximum of 286 ug/l indicates free phase TCE is likely to be present in the vadose zone beneath the western end of the pit.

- Vertical migration of free-phase TCE to the lower water table is hindered by only a thin layer of interbedded sands and clayey sands.

- Groundwater in the lower water table is slightly contaminated with VOCs. However, the lower water 0 table is contaminated with relatively high activities of tritium from an upgradient source.

- Vinyl chloride (23 ug/L maximum) and chloroform (1.6 ug/L maximum) have been detected on a very limited basis as pari of ongoing CPT characterization of the distal portion of the plume. Vinyl chloride and chloroform have not been identified in the groundwater adjacent to the pit and are therefore probably the product of naturally occurring reductive dechlorination of TCE within the distal portion of the plume.

Tritium detected in the groundwater at the CBRP is not consistent with contaminants found in CBRP soils above the water table or the CSM (Figure 4). Therefore, other sources in the vicinity, such as the industrial activities in C-Area, are thought to be contributing togroundwater contamination at the CBRP. Tritium is present at 19,400 picocuries, per liter (pCi/L) in the upper zone of the water table aquifer upgradient to the Pit Area and at significantly higher levels (94,400 pCi/L) in the lower zone of the water table aquifer at the same location. It is also present at significantly higher levels upgradient of the Pit Area (94.400 pCi/L) than it is down-gradient of the Pit Area, (52,900 pCi/L) in the lower zone of the water table aquifer. Side gradient (south) of the Pit Area, the tritium concentration is 215,000 pCi/L. This indicates the tritium is from a source other than the CBRP, since the concentrations generally decrease along the flow path and are higher in the deeper aquifer. Figure 7 illustrates the known tritium and VOC contamination in the upper water table in the C Reactor Area.

Groundwater analytical data in general indicate an upgradient source of the tritium within the upper and lower zones of the water table aquifer, such as the C-Area Reactor Seepage Basin (CRSB) or C-Area industrial facilities. Tritium activities are as high as 22,500,000 pCi/L immediately adjacent to the CRSB. As depicted in Figure 7, the tritium plume emanating from the CRSB appears to migrate parallel to the CBRP VOC plume with a small lateral separation between the two plumes in the vicinity of the CBRP. The two plumes converge approximately 400 feet downgradient from the CBRP and ultimately overlap. Based on these observations, tritium in the groundwater is not believed to be a result of past activities at the CBRP and, therefore, will not be addressed hereafter within this IROD. The source of the tritium and its impact on the environment is, however, the subject of ongoing characterizations (RFI/RI/BRA) of the C-Area Reactor and CBRP areas. A work plan to conduct additional characterization of this source has been submitted. Field investigations at this unit are scheduled to begin on June 30, 1998.

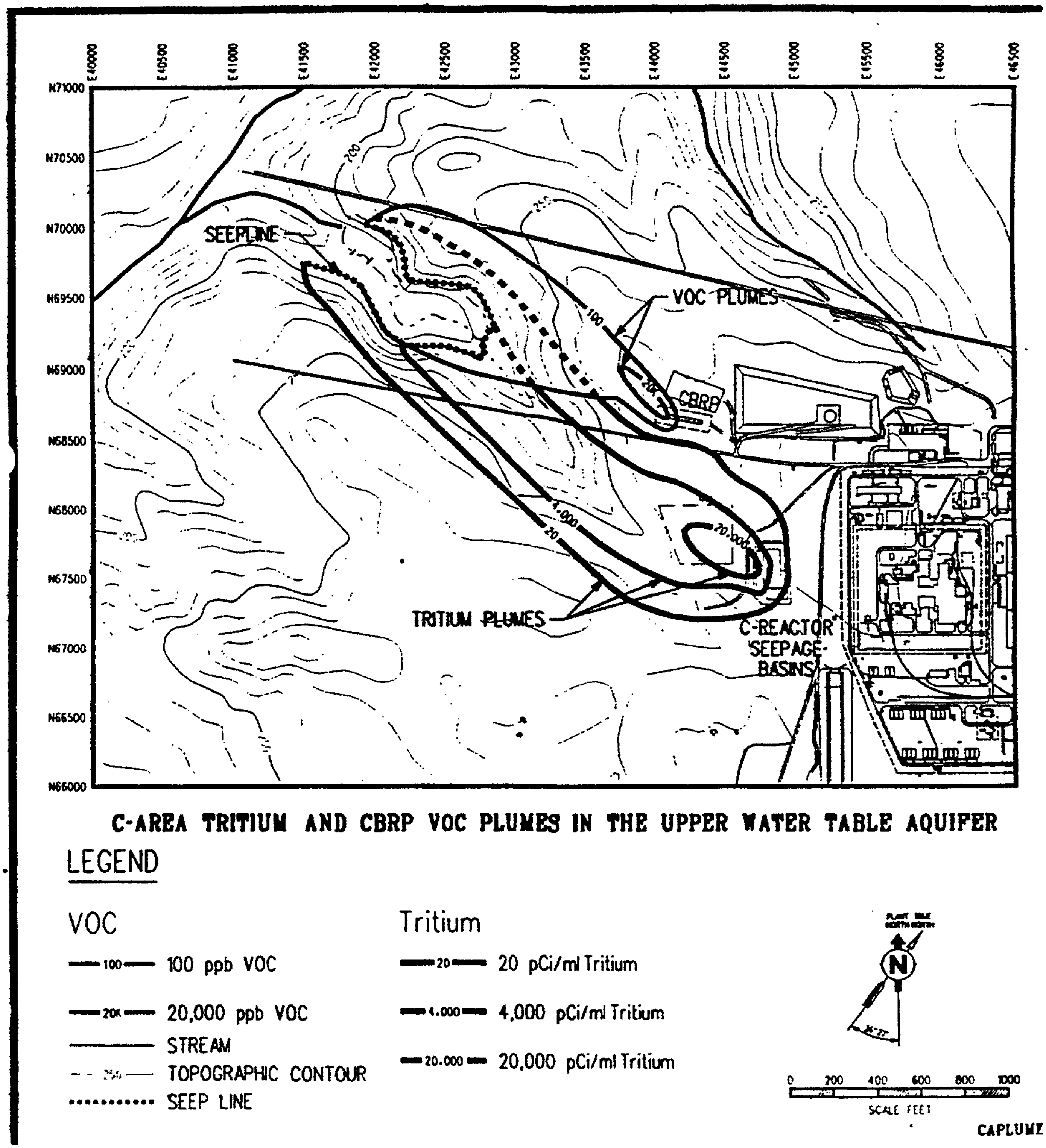
Fate and Transport Analysis

Predictive modeling techniques (i. e., SESOIL model) were used to determine whether chemicals present in the soils of the waste unit could migrate to the groundwater at concentrations greater than the MCL or the risk-based concentration (RBC) if no MCL is available. The predictive modeling runs were performed to simulate a potential migration period of 1,000 years. If the potential contaminant was predicted to exceed the MCL or RBC, the contaminant was considered a preliminary Contaminant Migration COC (CMCOC). Only TCE was retained as a final CMCOC.

VI. SUMMARY OF INTERIM ACTION OPERABLE UNIT RISKS

As part of the unit investigation/assessment process a baseline risk assessment (BRA) was performed using data generated during the assessment. The risk assessment was performed to: 1) systematically identify constituents of potential concern (COPC), preliminary constituents of concern (PCOC), and final constituents of concern (COC); and 2) assess the potential for adverse human health and ecological effects to occur from exposure to constituents at the waste unit (without any institutional controls or remedial actions).

Figure 7. C-Area Tritium and CBRP VOC Plumes in the Upper Water Table



Detailed information regarding the COC screening process, fate and transport constituents of concern (i.e., CMCOC), and the risk assessment process can be found in the latest revision of the RFI/RI/BPA report (WSRC 1997a). The latest version of the BRA does provide a realistic risk assessment with respect to most impacted media; however, recent groundwater characterization data and surface water and sediment evaluations from Fourmile Branch and Twin Lakes has not been assessed in the report. Sufficient characterization data and risk information is, however, available to support this interim action. The human health and ecological risks for current and future land use scenarios were evaluated and are presented below.

Human Health Risk Assessment

The human health risk assessment considered both current and future land uses and individuals likely to be exposed. Current exposures were evaluated for an on-unit worker who may occasionally be in the area. Future exposures were evaluated for a hypothetical industrial worker and residents. The resident scenario is the most sensitive land use. The CBRP is located in an area that has been recommended for future industrial (nuclear) use. (DOE 1996) Currently, the industrial area nearest to the CBRP is the C-Area Reactor, located approximately 2,500 feet to the southeast.

Exposure parameters were based on unit-specific data and default values published by EPA. EPA methods were used in conducting the risk assessment. Soil was evaluated for ingestion, inhalation, dermal and external radiation. Groundwater was evaluated for inhalation, ingestion and dermal contact, and produce was evaluated for ingestion. Risks were quantified for adverse noncancer and cancer effects.

As part of the RI evaluation, if the level of a constituent in a given medium exceeds a state or federal chemical-specific ARAR, that constituent is also included as a COC. For drinking water obtained from groundwater or surface water, the MCL is the controlling ARAR. The preliminary COCs generated from the results of the human health risk assessment for the Pit Area and the CBRP groundwater are detailed in the RFI/RI/BRA. (WSRC 1997a).

Land Use

Current exposure was considered for the on-unit worker who may occasionally be in the area. Groundwater exposures were not evaluated because the CBRP and surrounding area are undeveloped, and there are no drinking water wells currently located in the surrounding area. Therefore, the risk assessment for current land use focused only on soil at the Pit Area. There are no unacceptable risks for the on-unit worker. Risks for all exposure routes are less than 1 x 10^{-6}, indicating that under current conditions carcinogenic risk from chemicals and radionuclides is insignificant at the unit.

Future Use

Future exposures were evaluated for the hypothetical industrial worker and resident. The resident scenario is the most sensitive land use. The CBRP is located in an area that has been recommended for future industrial (nuclear) use. Currently, the industrial area nearest to the CBRP is the C-Area Reactor, located approximately 2,500 feet to the southeast. Groundwater was included as part of the risk assessment for the future land use scenario. Soil and the upper and lower zones of the water table aquifer were evaluated individually and are detailed below.

Pit Area Soil

The characterization of the primary and secondary sources associated with the CBRP indicates the soils are contaminated with inorganics, SVOCs, VOCs, pesticides, PCBs and radionuclides. Preliminary COCs were identified by comparing USCs with applicable or relevant and appropriate requirements (ARARs), analyzing for fate and transport in the environmental setting, and assessing the human health and ecological risk. Details are provided in the BRA portion of the latest revision of the RFI/RI/BRA (WSRC 1997a).

Upon completion of an analysis of uncertainties in the RFI/RI/BRA, only the two dioxins (HpCDD and OCDD) were retained as final COC's for the unit resident scenario, at the Pit Area. TCE is not a risk-based COC in the shallow soils (0 to 4 ft), but was detected in deeper soils as a contaminant migration constituent of concern (CMCOC) (i.e., soils contaminated with TCE at sufficient concentrations to continue to be a migration threat to groundwater via precipitation infiltration) . Those constituents retained as final COCs and CMCOCs and their risks are listed in Table 1 and are detailed in the latest revision of the RFI/RI/BRA (WSRC 1997a).

Upper Zone of the Water Table Aquifer

The ongoing RFI/RI investigation determined the groundwater in both the upper and lower zones of the water table aquifer at the CBRP is contaminated. For the upper zone of the water table aquifer, the human health risk evaluation identified preliminary COCs for the hypothetical future on-unit resident and for the hypothetical future on-unit industrial worker. Those groundwater constituents which were retained as preliminary COCs are detailed in the latest revision of the RFI/RI/BRA (WSRC 1997a). In the uncertainty analysis, PCE and TCE were retained as final COCs for the future resident scenario. TCE was retained as a final COC for the future industrial worker scenario. Dichloromethane was not identified as a human health COC but was retained as a final COC for exceedance of the MCL. These final human health COCs and their risks are listed in Table 1.

Lower Zone of the Water Table Aquifer

The ongoing RFI/RI investigation determined the groundwater in both the upper and lower zones of the water table aquifer at the CBRP is contaminated. For the lower zone of the water table aquifer, the human health risk evaluation identified preliminary COCs for the hypothetical future on-unit resident and for the hypothetical future on-unit industrial worker. Those groundwater constituents which were retained as preliminary COCs are detailed in the latest revision of the RFI/RI/BRA (WSRC 1997a). Upon completion of the uncertainty analysis, only tritium was retained as a final COC for the lower zone of the water table aquifer. However, as discussed in Section V, the source of the tritium is upgradient of the CBRP and is believed to be from the C-Reactor Seepage Basins (CRSB). Because tritium is not sourced from the CBRP, it is not a final COC for the CBRP. As no final COCs are sourced from the CBRP, no remedial actions for the lower zone of the water table aquifer were recommended by the CBRP Interim Action Proposed Plan (WSRC 1998a).

Ecological Risk Assessment

The ecological risk assessment defined the likelihood of harmful effects or the risk to ecological receptors from exposure to contaminants at the CBRP. Receptors include both terrestrial plants and animals and their habitats. Constituents in the upper 4 feet of soil were screened because this medium was the principal one resulting in exposures to plants and animals. Based on characterization of the environmental setting and identification of potential receptor organisms, a CSM was developed to deterrnine the complete exposure pathways through which ecological receptors could be exposed to COPCs,

The ecological risk assessment was completed for two scenarios. The current land use evaluated potential effects only from exposure to the top 1-foot of soil in CBRP. Evaluation of the effects of the future land use scenario considered the soil interval from the surface to a depth of 4 feet. Upon completion of the uncertainty analysis, only HpCDD in the Pit Area was retained as a final ecological COC for shrews in surface soils.

TABLE 1. FINAL HUMAN HEALTH AND ECOLOGICAL COCS AND CMCOCS

Media	Unit	COCs*	Basis/Receptor	Risk/Hazard Quotient
Soil	Pit Area	TCE	Migration to groundwater	**
		OCDD***	Risk to future resident	4×10^{-6}
		1,2,3,4,6,7,8-HpCDD***	Risk to future resident	3×10^{-6}
			Ecological risk to small burrowing animals (i.e., shrew)	NA/14.3
	Mounded Area	None	NA	NA
	Soil adjacent to Drainage Ditch	None	NA	NA
Groundwater	Upper zone of the water table aquifer	TCE	Risk to future resident; risk to future worker; exceedance of MCL	4×10^{-4}**** / 20 6×10^{-5}/2.7
		PCE	Risk to future resident; exceedance of MCLs	1×10^{-6}
		Dichloromethane	Exceedance of MCL	*****
	Lower zone of the water table aquifer	None	NA	NA

NA - Not Applicable
*Note:- Tritium was identified as a contaminant in the upper water table (up and sidegradient of the CBRP) but is not considered a COC because it is not sourced from the CBRP. Tritium and PCE were identified as contaminants in the lower water table (upgradient of the CBRP) but are not considered COCs because they are not sourced from the CBRP.
**CMCOC. based upon exceedance of MCL, not risk-based.
***Risk for future industrial worker does not exceed 1×10^{-6} The highest residential risk from either the surface of the subsurface soils is listed above in Table 1. Risk for HpCDD in the subsurface soils (0-4') is 1.7×10^{-6}. Risk for OCDD in the surface soils (0-l') is 3.4×10^{-6}.
****This table is based upon 1997 monitoring well data only. 1998 CPT data indicates maximum TCE concentrations are at 130,000 ug/L. Assuming this preliminary unvalidated CPT data would not be screened from risk protocols, a risk of 3×10^{-2} would be projected.

* * * * * COC due to exceedance of MCL, but not a risk-based COC.

Risk Conclusions

The overall conclusions of the BRA include the following:

- Mounded Area soils and the soil adjacent to the Drainage Ditch do not pose a significant risk to hypothetical human or ecological receptors, and, therefore, do not require remedial action. These areas are, therefore, dropped from further discussion within this IROD.

- Low concentrations of dioxins in soils within and beneath the pit pose minimal human health and ecological risks. Dioxin is a risk-based COC.

- TCE is not a risk-based COC in the shallow soils (0 to 4 feet), but was detected in deeper soils as a contaminant migration constituent of concern (CMCOC) (i.e., soils contaminated with TCE at sufficient concentrations which allow them to continue to be a migration threat to groundwater via precipitation infiltration).

- Groundwaterin the upper water table is sufficiently contaminated with VOCs so that it represents a significant risk to humanhealth, with TCE concentrations over 5,000-times the drinking water standard and MCL of 5 ug/L.

Contaminant Threat Review

A review of the final human and ecological COCs present within the soils and groundwater at the CBRP indicate that the wastes represent low-level and principal threat wastes. The contaminants within the soils and groundwater can be categorized as follows:

- Low concentrations of dioxins and metals in surface soils are thought to be a low level threat waste because the material represents relatively low risks to humans and moderate risks to the ecology, has a low potential for migration, and is easily contained

- Based on current data presented in Table 1, the relatively low concentrations of VOCs in soils within and beneath the pit appear to be low-level threat waste because they do not pose a risk to human or ecological receptors, have a low potential for significant migration (based upon contaminant migration modeling) and are easily contained. However, based upon high groundwater concentrations, principal threat waste is probably present in the vadose zone which the proposed interim action should address.

- The highly concentrated TCE in the aquifer sediments immediately adjacent to the pit in the upper zone of the water table aquifer are thought to represent a principal threat. The risk to humans from TCE in the groundwater is thought to be significantly higher than those presented in Table 1, which were based on the then available 1997 monitoring well data. Preliminary unvalidated 1998 CPT data indicates maximum TCE concentrations are at 130,000 ug/L versus the 1997 monitoring well data of 1,660 ug/L. Assuming this preliminary unvalidated CPT data would not be screened from risk protocols, a significantly higher risk would be projected. The high concentrations of TCE (130,000 ug/L) are thought to suggest the presence of free-phase TCE which is potentially mobile.

In conclusion, SRS believes that interim remedial actions should be considered for the >25,000 ug/L VOC areas of the groundwater plume and vadose zone in an effort to minimize the further migration of this principal threat. A thorough discussion of the specific remedial action objectives is provided in Section VII.

The actions suggested in this IROD (Section IX) are consistent with a bias for treatment of principal threat materials because

- treatment technologies are feasible and available in a reasonable time frame;

- the small volume and simplicity of the site make implementation technically and economically practicable;

- implementation of the treatment does not increase the risks to humans (including workers and the surrounding community) or the environment; and

- implementation will not result in severe effects across environmental media.

II INTERIM REMEDIAL ACTION OBJECTIVES (IRAOS) AND DESCRIPTION OF THE CONSIDERED ALTERNATIVES FOR THE CBRP OPERABLE

Interim Remedial Action Objectives

The IRAOs are specific early action goals developed to reduce risk to human health and the environment. These interim goals are used to ensure that the selected interim remedial alternatives will impact exposure pathways and media in a fashion that will reduce risk to human health and the environment. This IROD uses the interim remedial action objectives to initially evaluate the applicability of the remedial alternatives. IRAOs specify unit-specific contaminants, media of concern, potential exposure pathways, and remediation goals. The IRAOs are based on the nature and extent of contamination, threatened resources, and the potential for human and environmental exposure.

Based upon the human health, ecological, and contaminant migration risks (see Table 1) posed by the dioxins in the subsurface soil and the TCE in the deep soil of the Pit Area, the general soil IRAO is to:

- prevent direct contact with COC contaminated soils and reduce infiltration to minimize further migration of CMCOCs to the groundwater from soils within and beneath the CBRP.

The largest contribution to groundwater hazards is from TCE in both the future resident and future industrial worker scenarios (see Table 1). PCE poses significant risk in the future resident scenario only. Although dichloromethane poses no significant risk to human health, it is a COC to be remediated because concentrations in the shallow groundwater exceed the MCL. Based on the risks posed by these VOCs in the shallow groundwater, the general groundwater IRAO is to:

- treat the area in the vicinity of the pit, within the 25,000 ug/L VOC isoconcentration contour, with an objective to reduce concentrations and control the migration of VOCs within the 25,000 ug/L VOC contour.

As previously stated, this IROD istailored to the limited scope and purpose of the interim action and does not specify the final acceptable exposure levels for the site. Specifically, this IROD will not identify final remedial goals; but the selected interim alternatives, will be consistent with the IRAOs and any final action. The interim action RAOs will be used to develop the final action RAOs as more information from the ongoing RFI/RI/BRA and planned interim action operations concerning the unit and potential remedial technologies becomes available. Remediation goals will ultimately be determined as part of the final remedial action determination and will establish acceptable exposure levels that are protective of human health and the environment (CERCLA 300.430(e)(2)(i)). The final remedial goals will be consistent with applicable or relevant and appropriate requirements (ARARs) and will mitigate any reasonable risk to human health and the environment. This alternative selection approach is consistent with regulatory guidance on preparing interim action proposed plans and records of decision (EPA 1989).

This IROD uses the IRAOs to initially evaluate the applicability of remedial alternatives. As detailed in Section IV, a PAA was conducted to support the development of a CMS/FS for the CBRP. This IROD used the PAA as a basis for selecting appropriate interim action alternatives for CBRP contaminated soil and groundwater. The detailed analysis of alternatives in the preliminary alternative analysis identified five alternatives for soils and five alternatives for groundwater. The "S" associated with the alternatives refers to soil alternatives. The "GW" refers to groundwater alternatives. The total cost of each alternative including a breakdown of the capital and operation/maintenance costs is provided in Table 2.

Description of Considered Alternatives

Soil Alternatives

<u>Alternative S-1: No Action</u>

The "No Action" option is required by the NCP to serve as the baseline for comparison with other remediation methods. No Action is not actually a technology but is a general response action. Under the No Action alternative, natural attenuation mechanisms may reduce contaminant concentrations to levels below proposed concentration-based remediation goals. Under this alternative, no remedial actions would be conducted to remove, treat, or otherwise lessen the toxicity, mobility, or affected volume of contaminated media. Maintenance of the existing vegetative and soil cover would cease, and the media would be allowed to deteriorate naturally.

TABLE 2. SOIL AND GROUNDWATER INTERIM AMON ALTERNATIVES AND CAPITAL AND OPERATIONS AND MAINTENANCE (O&M) COSTS*

	ALTERNATIVES	CAPITAL COST (SK)	O&M COST (SK)	TOTAL COST (SK)
SOIL				
S-1	No Action	0	0	0
S-2	Institutional Controls	0	61	61
S-3	**Native Soil Cover****	175	20	195
S-4	Thermal Desorption/Incineration	548	200	748
S-5	Offsite Disposal	785	0	785
GROUNDWATER				
GW-1	No Action	0	0	$0
GW-2	Institutional Controls	347	60	407
GW-3	In-Situ Air Sparging- (with SVE)	800	1,200	$2,000
GW-4	In-Situ Methane Biodegradation (with SVE)	1.000	1,500	$2,500
GW-5	Ex Situ Air Stripping (pump and treat)	500	700	$1,200

*Until characterization is complete and the effectiveness of the interim action system is evaluated, the overall cost for a final action is difficult to assess. Characterization in the vicinity of the CBRP and preliminary engineering for the interim system are sufficiently complete to support the above cost analysis. In accordance with the IRAOs groundwater alternatives GW-3, GW4, and GW-5 are focused on a smaller area of treatment and a shorter time duration. The area of treatment selected is the 25.000 ug/L area shown in Figure 6. The duration selected was 5 years.

****Preferred Alternative**

The No Action alternative would not be protective of human health or the environment. would not eliminate potential future routes for human exposure, and would not be protective of human health because of the potential for soil exposure to a worker, and would not provide control of leaching of contaminants to groundwater. The No Action alternative would require no construction and could, therefore, be implemented immediately. The estimated cost associated with the No Action alternative is $0.

Alternative S-2: Institutional Controls

Institutional controls are administrative measures taken to minimize the potential. for human exposure. Administrative institutional controls consist of filing deedrestrictions or notifications and performing 5-year remedy reviews. Deed restrictions and notifications inform potential future buyers or developers of the hazardous waste disposal activities previously conductedat the unit and limit the types of future activities that could be conducted on the property (e.g., restrictions on excavation and land use).

Institutional controls are effective in further minimizing the potential for human exposure to CBRP contaminants and are relatively easy to implement. In addition, costs associated with institutional controls are considered low relative to other remedial responses. Institutional control costs include surveying, filing deed restrictions or notifications, and preparationof 5-year remedy reviews. Five-year remedy reviews are required for any waste site that has provisions that prevent unrestricted land use or leaves wastes in place. Under the alternative, the soils within and below the pit would continue to be an ecological risk and a source of TCE groundwater contamination. The estimated cost associated with the alternative is $61,300.

Alternative S-3: Native Soil Cover

This alternative consists of placing a layer of clean soil over the entire surface area of the CBRP. This additional layer of soil will act as a barrier to prevent soil exposure to future human and ecological receptors and will also reduce precipitation infiltration tominimize further migration of TCE from the CBRP soils to the groundwater. Therefore, this alternative satisfies the remedial action objectives and would be protective of human health and the environment by forming a physical barrier to prevent ingestion and direct exposure to contaminated soil.

A low permeability engineered cover would be sufficient to minimize infiltration, intrusion, and surface erosion. The cover design would be approved by both EPA and SCDHEC prior to construction. The cover would include in area of approximately 0.6 acres (27,000 square feet). A soil cover is a performance-based engineering approach since it does not reduce the total mass of COCs.

The thickness of the soil cover is determined by the contaminants present in the waste unit, the potential impact to groundwater,and the future land use proposed for the waste unit. Subject to final design development and approval, the soil cover will be a two-layer system consisting of a compacted sandy clay layer and a vegetative layer placed on top. The vegetative layer would be maintained to prevent erosion from wind or rain. Thickness of the sandy clay layer will be a minimum thickness of 2 feet.

Hydraulic conductivity will be approximately 1.0 x 10^{-5} cm/sec, The surface slope of the cover will be a minimum of 3 percent and a maximum of 5 percent. Side slopes will be no steeper than 4:1 (H:V). A minimum 6-in vegetative layer will be added to minimize soil erosion of cover. Infiltration will be reduced by no less than 60 percent. The cover would greatly reduce the leaching of soil contaminants to the groundwater, where MCLs would be exceeded; but the deep soils (4 to 60 feet) below the pit would continue to be a source of TCE groundwater contamination. As part of the final ROD, the native soil cover would be maintained and institutional controls will remain in place in perpetuity or until the waste no longer poses a threat to human health or the environment.

Costs associated with Alternative S-3 include labor and materials to install the earthen cover and to implement institutional controls common to all soil alternatives. Costs also include operation and maintenance costs of the cover and institutional controls. The estimated cost associated with this alternative is $194,800.

Alternative S-4: -Thermal Desorption/Incineration (with Compacted Backfill Cover)

Dioxin risks were shown for the 0 to 1.2 in (0 to 4 feet) soil layer; thus, this layer would need to be remediated. This option consists of removing the upper 1.2 m (4 feet) of soil, passing it through a rotary kiln to vaporize (desorb) the dioxins present. The vapor stream is sent through an incinerator that decomposes dioxins to harmless materials. The remediated soil can be returned to the CBRP and the unit can be released for unrestricted use.

The compacted backfill would be sufficiently impervious to mitigate infiltration and promote runoff of surface water. Two feet of native soil would be loosely placed over the compacted backfill. The Pit Area would be seeded to revegetate the unit. Erosion control measures would be implemented until vegetation became established. Administrative controls similar to those of Alternative S-3 would be implemented.

Alternative S-4 would be protectiveof human health and the environment, including ecological receptors. Virtually all contamination in Pit Area surfaceand subsurface soils would be permanently destroyed by the treatment and the compacted backfill with a native soil cover would sufficiently reduce leaching of contamination in lower levels. Alternative S-4 would eliminate the harmful human exposure and bio-uptake scenarios of dioxins in the human health risk assessment and prevent groundwater from exceeding MCLs.

The equipment and materials necessary for this alternative are readily available. The desorption/incineration units are mobile and require no construction, and the alternative could, therefore, be implemented immediately. Backfilling the excavated area and construction of the cover would require readily available earth-moving equipment and experienced labor. The deep soils (4 to 60 feet) below the pit would continue to be a source of TCE groundwater contamination. The estimated cost for Alternative S4 is prohibitively expensive at $748,000.

Alternative S-5: Offsite Disposal (With Compacted Backfill Cover)

Alternative S-5 would involve excavation of contaminated surface and subsurface soils within the Pit Area and shipment offsite to a licensed disposal facility. The excavated soil would either be placed directly into lined and covered haul trucks or into lined and scaled containers for transport. The soil would be excavated to a depth of 4 feet. The excavated area would be backfilled with native soil from a local borrow pit. Contaminated soils deeper than the excavated 4 feet depths are insignificant to human health and ecological risk, however, they do present a leaching concern. To prevent significant leaching of contaminants to the groundwater, the native soil backfill would be compacted to a height 2 feet above grade level, similar to the compacted backfill of Alternative S-4. A 6-inch vegetative cover of loose native soil would be placed over the compacted backfill. Vegetation over the cover would be established to prevent erosion.

Administrative controls similar to those of Alternative S-3 would be implemented.Land use restrictions filed at the time the property is transferred to nonfederal ownership would require appropriate precautions and authorization before soil in and beneath the backfill cover could be disturbed. Deed notifications would serve to inform future residents and industries that the area was once used to manage hazardous materials, and that disturbance of the backfill area and soil cover and soil up to 4 feet below the natural grade should be avoided. The institutional controls would also ensure any continuing groundwater monitoring and cover maintenance commitments are met.

Alternative S-5 would be protective of human health and the environment. Virtually all of the contamination present in Pit Area surface and subsurface soils to a depth of 4 feet would be permanently removed from the unit. Removal of the Pit Area soil would eliminate the hazardous source material, thereby eliminating risk to future residents and ecological receptors. The deep soils (4 to 60 feet) below the pit would continue to be a source of TCE groundwater contamination.

Alternative S-5 is implementable. Construction would involve the use of available materials and conventional earth-moving equipment. The cost for this alternative includes excavation, transportation, and waste disposal of the contaminated soil (i.e., top 4 feet). Estimated present worth cost associated with Alternative S-5 is prohibitively expensive at $785,400.

Groundwater Alternatives

Alternative GW-1: No Action

Under this alternative, no remedial efforts would be conducted to remove, treat, or otherwise lessen the toxicity, mobility, or affected volume of contaminated media, This alternative assumes that the unit would potentially be released for unrestricted use. The No Action alternative would not be protective of human health or the environment and would not eliminate potential future routes for human exposure, Potential future releases are not reduced or eliminated. The unit would continue to be a source of contaminated groundwater and would not provide protection of the environment at points of exposure. The No Action alternative would require no construction and could, therefore, be implemented immediately. The estimated cost associated with the No Action alternative is $0.

Alternative GW-2: Institutional Controls

Under this alternative, a monitoring program for groundwater would be implemented. The monitoring program would monitor the rate of attenuation of contamination at the site from natural processes such as degradation and dispersion. The nearest point of exposure is determined to be at the nearest point of discharge to the surface streams (a tributary of the Fourmile Branch). Monitoring would continue until contaminant concentrations reach acceptable levels as defined by remediation goals.

Existing SRS institutional controls would prevent exposure of environmental or human receptors to contaminants by enforcing land use and groundwater use restrictions. The existing SRS institutional controls would also restrict access by the public to the area affected by the waste unit contamination.

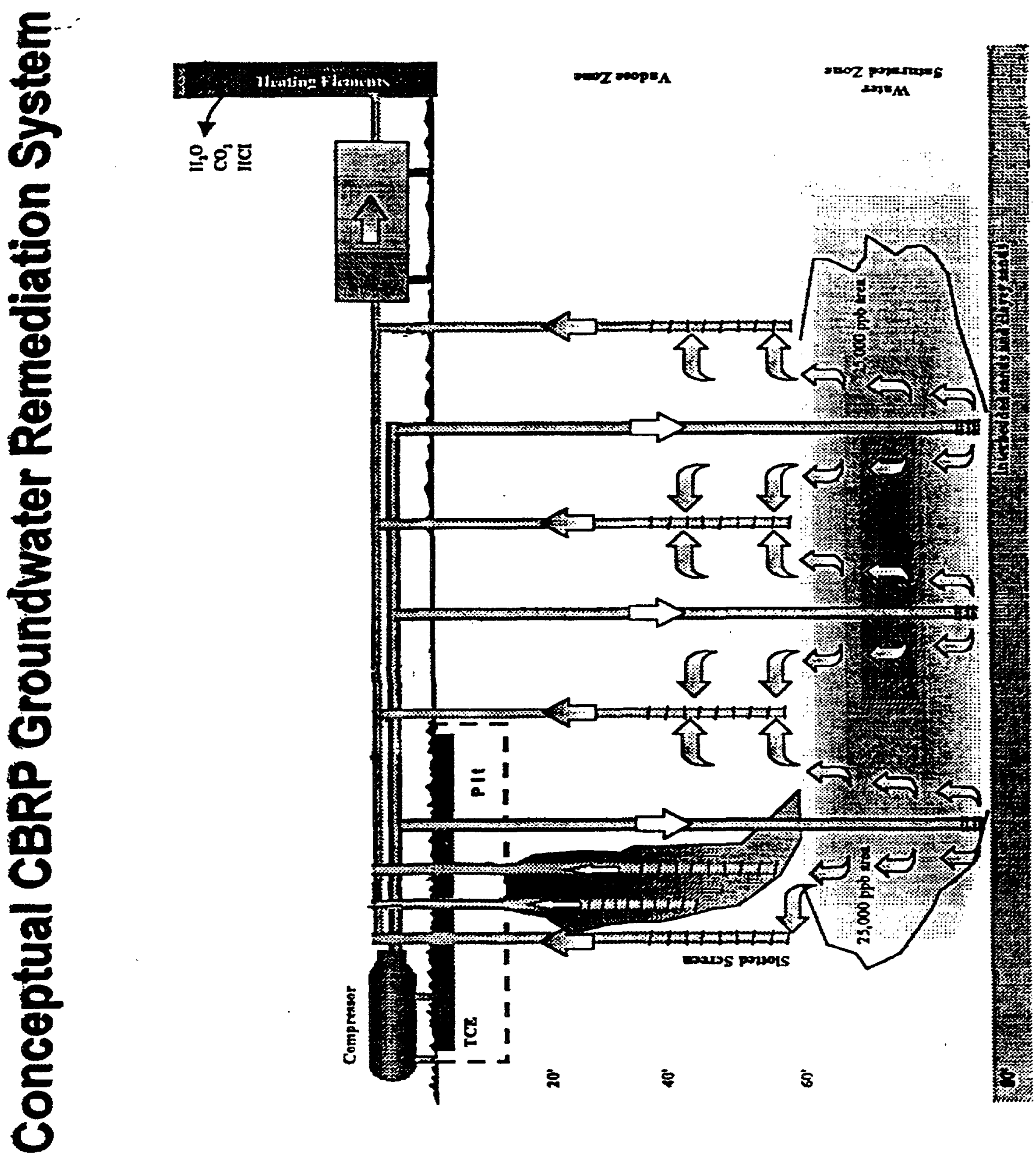
Alternative GW-2 would be protective of human health and the environment. Over time, as the VOCs decay and concentrations lessen through dispersion, the risk to human health and the environment would decrease. However, as a stand-alone alternative, biodegradation, volatilization, and dispersion would potentially not decrease contaminant levels to acceptable levels in a reasonable amount of time.

Alternative GW-2 would require no construction of groundwater monitoring wells other than the installation of the six "point of compliance" wells. No specialized equipment or technical specialists would be required for installation, and laboratories are readily available to perform the required analyses. The remedy could be implemented immediately. Costs associated with Alternative GW-2 include labor and materials to install the six monitoring wells and conduct the required groundwater monitoring and associated administrative controls. Although this alternative would be performed indefinitely, the costs are estimated for 30 years. A 5-year remedy review is required. The estimated cost associated with the alternative is $406,600.

Alternative GW-3:_ In-Situ Air Sparging (w ith Soil Vapor Extraction)

In-Situ, Air Sparging (with Soil Vapor Extraction), conceptually depicted in Figure 8, would involve operation of an air sparging system that would inject air into the bottom of the contaminated groundwater plume. The contaminants would then pass into the injected air, as it moves upward through the plume and, in turn, would flow into the relatively dry soil (vadose zone) above the water table. These volatilized groundwater VOCs would be extracted via vacuum wells by a soil vapor extraction (SVE) system as they rise into the vadose zone. Additionally, VOCs residing in the vadose zone (see Figure 8) would also be extracted via these same vacuum wells. The extracted soil vapors would be processed through a liquid-phase separator to remove condensate. The offgas would then either be mated or released into the atmosphere in accordance with release requirements.

Figure 8. Conceptual CBRP Groundwater Remediation System



Institutional controls would involve the installation and maintenance of lone-term monitoring systems for groundwater to monitor the rate of attenuation of organic contamination at the site. Monitoring would be similar to that described for Alternative GW-2, except that soil vapor monitoring would be conducted as part of the SVE system operation.

Alternative GW-3 would be protective of human health and the environment by removing VOCs from the shallow groundwater. Theestimate for this alternative assumes a 5-year period of operation of the in-Situ Air Sparging/Soil Vapor Extraction (AS/SVE) system. Installation would involve straightforward construction processes readily implementable in a relatively short time frame. Construction would involve the use of available materials from commercial vendors and the use of conventional equipment. In-situ AS!SVE has been commonly used at other hazardous and mixed waste sites.

Installation of the AS/SVE system is targeted to remove high concentrations of TCE that could be in a free phase, in the upper water table. The AS/SVE system will prevent rapid migration from the upper water table to the lower table and will be consistent with the IRAOs. The use of AS/SVE to volatilize and extract the VOCs; in the upper water table will not result in significant releases of tritium to the environment or radiological hazards to workers because the tritium activities are very low. The relatively high activities of tritium associated with the CRSB are principally sidegradient of the CBRP and will not effect remedial operations.

Costs associated with Alternative GW-3 include labor and materials to install the extraction wells and injection points, blowers, and an offgas control system. Also included is the cost for the operation and maintenance of the AS/SVE system for a 5-year operation and maintenance period. The estimated cost associated with the alternative is $2,000,000. A more thorough discussion of this alternative with respect to the interim action is provided in Section IX.

Alternative GW-4: In-Situ Methane Biodegradation with (Soil Vapor Extraction)

Alternative GW4 would involve operation of a bioremediation/SVE system and the installation of associated wells in the Pit Area. Alternative GW-4 would be similar to Alternative GW-3 in that it would involve installing air sparging points and SVE wells. The primary difference between the alternatives is that GW-4 would introduce a methane and oxygen (air) mixture into the ground to enhance methanotrophic biological degradation of the ch1orinated solvents by co-metabolism. This enhanced biodegradation would accelerate rernediation over natural attenuation and AS/SVE by themselves.

Institutional controls would involve the installation and maintenance of long-term monitoring systems for groundwater to monitor the rate of attenuation of organic contamination at the site. Monitoring would be similar to that described for Alternative GW-2, except that soil vapor monitoring would be conducted as part of the SVE system operation.

Alternative GW-4 would protect human health by substantially reducing the volume of contaminants in groundwater by degrading and removing the VOCs. In-Situ Methane Biodegradation/SVE would involve straightforward constructionprocesses readily implementable in a relatively short time frame. Construction would involve the use of available materials from commercial vendors and the use of conventional equipment (e.g. drill rigs). The alternative may not be well suited for an interim action. Specifically, In-Situ Methane Biodegradation with SVE may not be effective on the free phase TCF, which is thought to be present in the upper water table. In addition, the time required for biodegradation of the solvents is likely to be long (10 years) for an interim action. Costs associated with Alternative GW-4 include labor and materials to install the extraction and injection wells, blowers, and an offgas, control system. Also included in the cost for methane biodegradation/SVE system is a 5year operation and maintenance period. The estimated cost associated with the alternative is $2,500.000.

Alternative: Ex-Situ Air Stripping

Alternative GW-5 would include a groundwater extraction system designed to capture VOC contaminated groundwater between the pit and Fourmile Branch. Once extracted, the groundwater would be treated onsite using air stripping followed b) granular activated carbon adsorption, if needed, as a polishing step. Once treated, the residual groundwater would be discharged directly to local surface water.

Alternative GW-5 would be protective of human health and the environment with respect to VOCS, and would reduce the volume of VOCs in groundwater. If Alternative GW-5 is employed, its groundwater extraction would create a significant cone of depression (i.e., lower the water table around each pumping wen), which would eventually cause migration of tritiumbearing groundwater from the CRSB plume. Alternative GW-5 would essentially cause mixing of VOCs and tritium in the upper water table. The operation of the air stripper would result in significant atmospheric releases of tritium to the environment and potentially pose unnecessary health risks to workers. Estimated present worth costs associated with Alternative GW-5 is $1,200,000.

II SUMMARY OF COMPARATIVE ANALYSIS OF THE INTERIM ALTERNATIVES

The previous section detailed the five alternatives for soils and five alternatives for groundwater. In the IAPP (WSRC 1998a), each of these remedial alternatives was evaluated using nine criteria established by the NCP. The criteria were derived from the statutory requfivnents of CERCLA Section 121. The NCP (40 CFR & 300.430 (e) (9) sets forth nine evaluation criteria that provide the basis for evaluating alternatives and selecting a remedy. The criteria are as follows:

- overall protection of human health and the environment
- compliance with ARARs
- long-term effectiveness and permanence
- reduction of toxicity, mobility, or volume through treatment
- short-term effectiveness
- implementability
- cost
- state acceptance
- community acceptance

In selecting the preferred alternative, theabove criteria are used to evaluate the alternatives developed. Seven of the criteria are used to evaluate all the altematives based on human health and environmental protection, cost, and feasibility issues. Comparative evaluations of all the remedial action alternatives against these seven criteria are detailed in the IAPP and briefly summarized in the Comparative Alternative Analysis section below. The preferred alternatives are further evaluated in the subsequent state acceptance and community acceptance sections below.

Comparative Alternative Analysis

Alternative GW-3 would be protective of human health and the environment by removing VOCs from the shallow groundwater. The removal of contamination would significantly reduce the risk from groundwater ingestion and contact to future residents and workers. Alternative GW-3 involves active treatment commonly used at other hazardous and mixed waste sites to volatilize the contaminants and remove them from the groundwater. Installation, operation, and maintenance of the AS/SVE system could be readily implemented within a short time period. Installation, operation, and maintenance of the system would present minor risk to the remedial worker, which would be mitigated through the use of proper protective equipment and adherence to approved health and safety procedures.

Alternative GW-3 is selected as the preferred alternative over Alternative GW-2 because in Alternative GW-2 it is uncertain that groundwater concentrations would decrease below MCLs before reaching a point of exposure. Alternative GW-3 is selected over Alternative GW-4 because it is less expensive with comparable results. Further, Alternative GW-4 was not selected because "hot spot" concentrations of TCE in the groundwater beneath the Pit Area are presently at levels that would likely poison the biological degradation process. Alternative GW-5 was not selected because it would likely cause mixing of VOCs and the relatively high activities of tritium sidegradient of the unit.

Pursuant to the EPA IROD guidance (EPA 1989) and checklists, the alternative selection focused upon the key ARARs listed below which apply to the limited scope of the interim action. The alternative selection also considered final action ARARs to ensure the interim action would be compatible.

- Fugitive Particulate Emissions (40 CFR 50.6 and SC R61-62.6, Section III)
- SC Toxic Air Pollutant regulations (SC R61-62.1, Section II, paragraph 3)
- SC Well Construction regulations (SC R61-71)

State Acceptance

Per EPA guidance on presumptive response strategies for groundwater (EPA 1996), groundwater response actions should be implemented in a phased approach with provisions for monitoring and evaluating their performance. Consistent with this guidance, an interim action is documented herein to remove high concentrations of TCE from a known source of VOC contamination.

State of South Carolina and EPA concurrence with the proposed interim action, detailed in Section IX, has been received. Both alternatives are effective in protecting human health, are readily implementable, and are reasonably priced for the benefit received.

Community Acceptance

Community acceptance of the preferred alternative is assessed by giving the public an opportunity to comment on the IAPP. The public was notified of a public comment period through mailings of the *SRS Environmental Bulletin*, the *Aiken Standard*, the *Allendale Citizen Leader*, the *Barnwell People Sentinel*, *The State*, and *Augusta Chronicle* newspapers, and through announcements on local radio stations. In addition, the IAPP was presented to the SRS Citizen Advisory Board in an open public meeting (May 6, 1998) during the public comment period. Public comments concerning the proposed remedy are addressed in the Responsiveness Summary of this IROD.

IX. THE SELECTED INTERIM REMEDY

Based on the risks identified in Section VI, the CBRP Pit Area soil poses a significant risk to human health. Significant carcinogenic risks to the potential future worker or resident are driven by exposure from the Pit Area soils contaminated with organic chemicals and shallow groundwater contaminated with VOCs. Significant potential for contamination of groundwater exists from leaching of VOCs caused by rainwater infiltration.

Based on the CERCLA evaluation criteria, the preferred alternatives that successfully address the IRAQs to prevent or mitigate these hazards are Alternative S-3, Native Soil Cover, for Pit Area soils and Alternative GW-3, In-Situ Air Sparging with SVE, for unit groundwater. Capital and O&M costs are listed in Table 2. The selected remedial alternatives are consistent with EPA guidance and the NCP for sites that have relatively large volumes of waste with low levels of contamination. They effectively represent the integration of IRAQs and risk management principles.

Native Soil Cover

The preferred alternative for Pit Area soil, Alternative S-3, consists of placing a layer of clean soil over the entire surface area of the CBRP. This additional layer of soil will act as a barrier to prevent soil exposure to future human and ecological receptors and will also reduce precipitation infiltration to minimize the further migration of TCE from the CBRP soils to the groundwater. Therefore, this alternative satisfies the remedial action objectives and reduces the risk to humans and the environment.

The soil cover is consistent with present and future land use expectations, because the CBRP is located in an area that has been recommended for industrial use by the SRS Citizens Advisory Board, and it is so designated by DOE. In addition, the *Savannah River Site Future Use Report Stakeholder Recommendations for SRS Land and Facilities* (DOE 1996) includes the recommendation that "residential uses of SRS land should be prohibited." Existing SRS institutional controls would prevent exposure to the industrial worker by limiting activities in the vicinity of the CBRP if the recommendations are upheld. However, in the event the property was ever transferred to nonfederal ownership, land use restrictions and notifications would be filed as part of the final ROD.

In conclusion, Alternative S-3 is selected as the preferred soil alternative because it is the least expensive alternative that satisfies the IRAQs with comparable protection of human health, the ecosystem, and the groundwater. Alternative S-3 is easily and quickly implementable because commercial, experienced resources are readily available. The hazards to the workers are slight. Positive health and safety practices would minimize inhalation of fugitive dust and standard industrial accidents.

AS/SVE

The selected groundwater remedy, In-Situ Air Sparging (with Soil Vapor Extraction), conceptually depicted in Figure 8, would involve operation of an air sparging system that would inject air into the bottom of the contaminated groundwater plume. The contaminants would then passinto the injected air, as it moves upward through the plume and, in turn, would flow into the unsaturated soil (vadose zone) above the water table. These volatilized groundwater VOCs would be extracted via vacuum wells by a soil vapor extraction (SVE) system as they rise into the vadose zone. Additionally, VOCs residing in the vadose zone (see Figure 8) would also be extracted via these same vacuum wells. The extracted soil vapors would be processed through a liquid-phase separator to remove condensate. The offgas would then either be treated or released into the atmosphere in accordance with release requirements.

Installation of the AS/SVE system is targeted to remove high concentrations of TCE in the upper water table that could be in a free phase. The AS/SVE system, will prevent rapid migration from the upper water table to the lower water table will be consistent with the IRAOs.

As discussed in Section VII, the primary difference between this alternative (GW-3) and biodegradation (GW-4) is the injection of methane along with air. As the design and capital costs are relatively low, the proposed Alternative GW-3 will be designed, where cost effective, to allow the addition of methane or other nutrients as an injection option.

Simultaneous institutional controls would involve the installation and maintenance of long-term monitoring systems for groundwater, surface water, and biota to monitor the rate of attenuation of organic contamination at the site. Monitoring would continue for an indefinite period until sampling indicated remediation is successful in reducing groundwater contaminant levels below ARARs. Existing SRS access controls will be used to restrict the public and limit utilization of the site to industrial workers.

The preferred alternative (GW-3: air sparging in conjunction with SVE) offers the following advantages:

- Air sparging induces volatilization of VOCs in the groundwater and also provides oxygen to the groundwater, which is necessary for biodegradation and

- The injection points in the saturated zone could be used to introduce reagents that would assist in the degradation of the solvent plume;

- SVE increases the volatility of the VOCs in the vadose zone and also ventilates the vadose zone to facilitate removal of volatilized VOCs.

A groundwater concentration of 11,000 ug/L is typically thought to be required to suspect a high probability for the presence or freephase TCE. Figure 6 illustrates the area adjacent to the CBRP thought to have the highest potential for free phase TCE in the upper water table (i.e., 25,000 ug/L contour). This IROD proposes treatment of the 25,000 and 20,000 ug/L areas adjacent to the pit illustrated in the current contaminant contours depicted in

Figure 6. As shown in Figure 9, sparging and extraction cells will be concentrated within the 25,000 ug/L TCE zone, with fewer cells in the 20,000 to 25,000 ug/L interval. The total AS design flow rate is 300 cfm. To ensure complete recovery of the sparged air, the total SVE design flow rate is slightly greater at 500 cfm. Catalytic oxidation would be used for control of the SVE offgas because it is more cost-effective than carbon adsorption.

Per EPA guidance on presumptive response strategies for groundwater (EPA 1996), groundwater response actions should be implemented in a phased approach with provisions for monitoring and evaluating their performance. In accordance with the phased approach provisions in this guidance, this interim action is documented herein to allow the treatment system design to be evaluated and optimized. The goal of the interim system will be to treat the area in the vicinity of the pit within the 25,000 ug/L VOC isoconcentration contour to reduce concentrations and stabilize the migration of TCE within the 25,000 ug/L VOC contour. The criteria used to calibrate and evaluate the remedial action will include, at a minimum, the following monitoring: groundwater VOC concentrations within and adjacent to the treatment zone, AS radius of influence and SVE VOC air emissions rates.

Proposed monitoring well locations from the Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan (CMI/RD/RDR/RAWP) Rev. 0 (WSRC-RP-98-4058) are illustrated in Figure 10. Associated geologic, hydrogeologic, and hydraulic features are provided as Figure 11. The information depicted in Figure 11 is described in the Phase II RFI/RI Work Plan (WSRC 1998b).

Performance of the interim action will be assessed continuously. If it is determined during annual performance reviews that the interim action is not effective, a decision will be made, in consultation with EPA and SCDHEC, on whether to continue, modify, expand or discontinue this interim action. System modifications may include

- number, location and configuration of the cells may be changed to improve the performance of the system;

- positive and negative air flow rates, temperatures, and pressures may be modified to improve performance; and after the higher concentration areas targeted by this interim action become remediated to concentrations amenable to bioremediation, nutrients may be added to the air sparging system to enhance biodegradation.

- Air injection may be utilized in the vadose zone extraction points to promote VOC volatilization and create pathway for extraction.

Figure 9. CBRP AS/SVE Well locations and the Upper Water Table TCE Contours (µg/L)

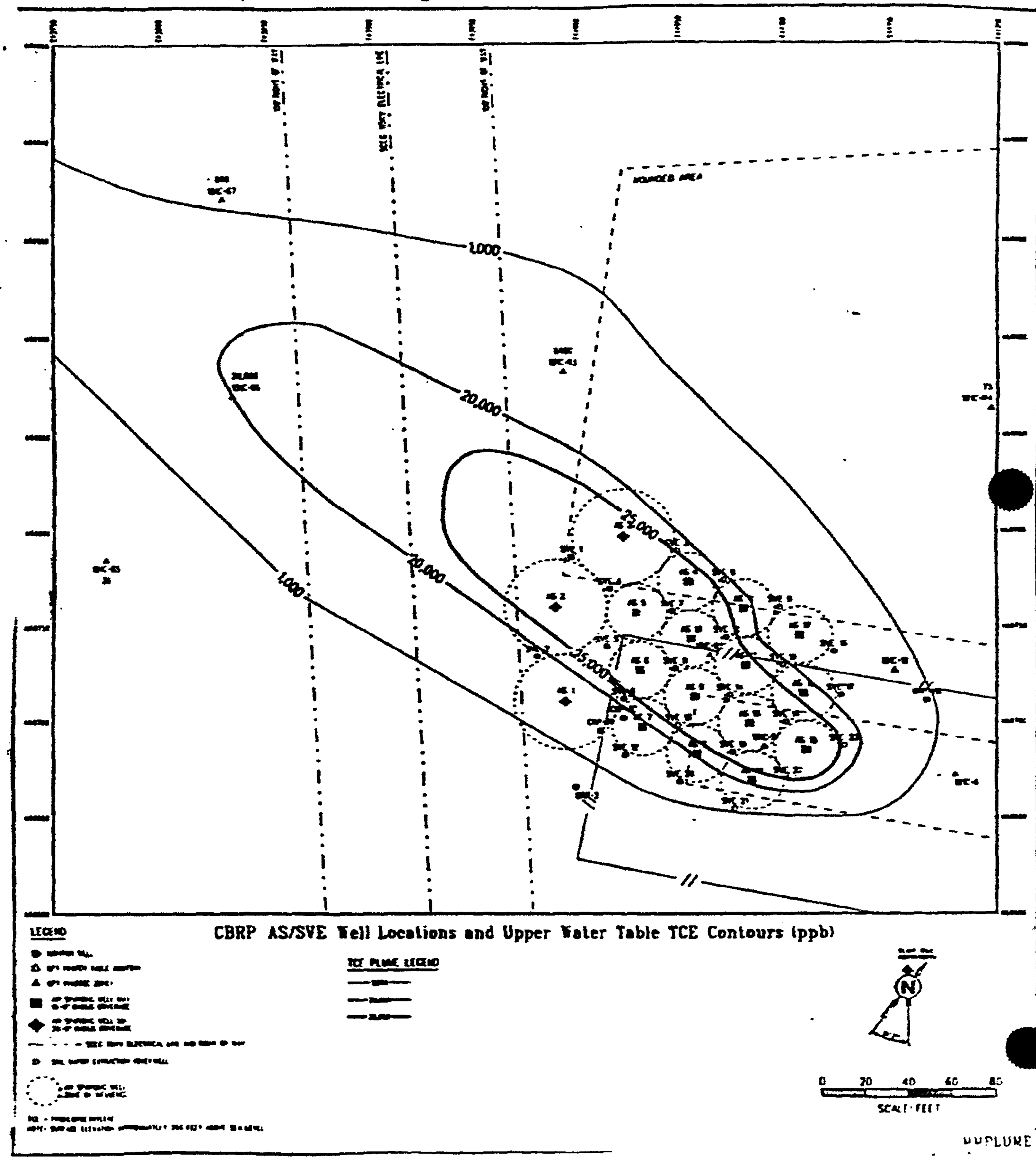
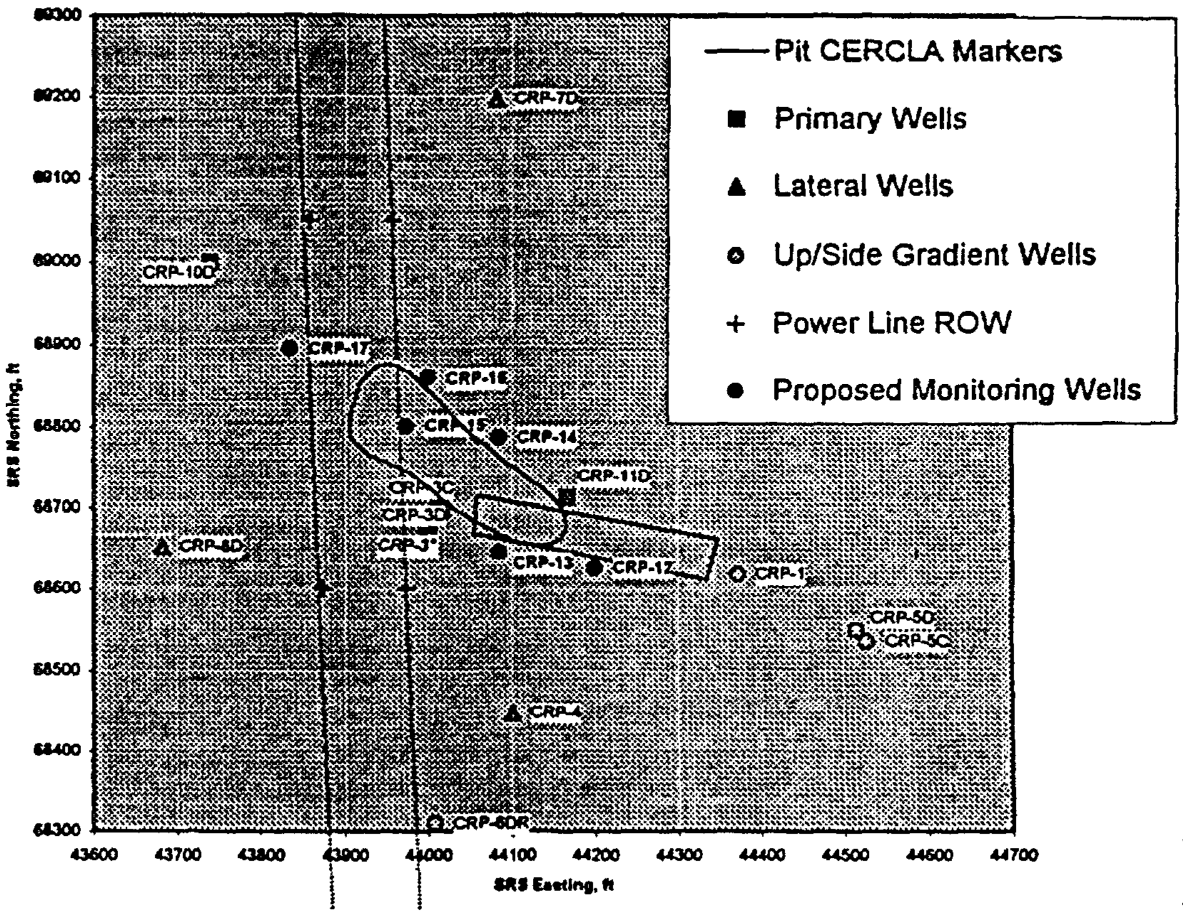


Figure 10. CBRP Site Map Illustrating locations of Current and Proposed Monitoring Wells with Respect to the 25,000 ug/L Contour and SVE/AS Treatment Zone



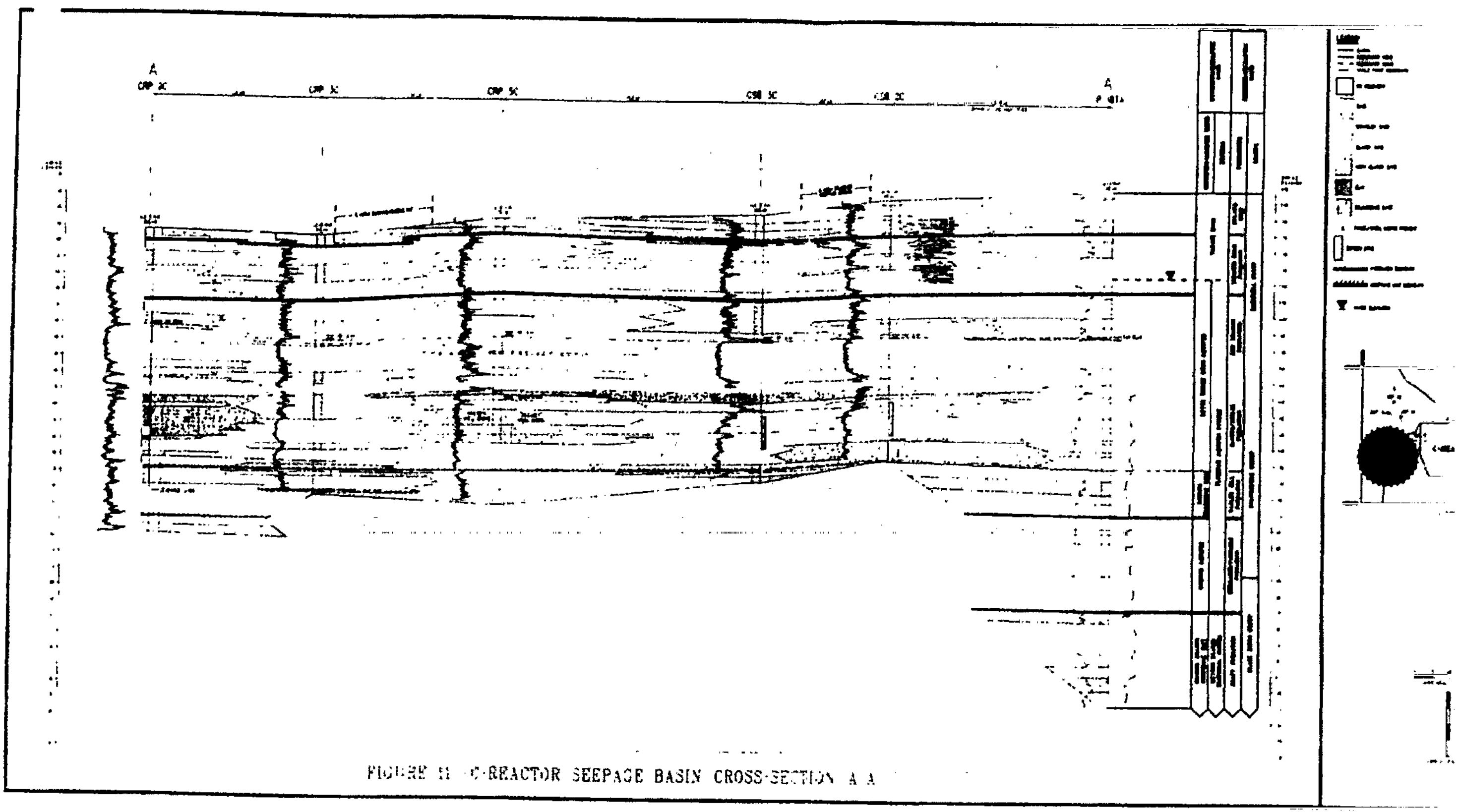


FIGURE 11 C-REACTOR SEEPAGE BASIN CROSS-SECTION A A

Pages 4

The AS/SVE flow rates; monitoring criteria; system performance modifications; and soil cover specifications provided in section V.B will be finalized with the approval of SCDHEC and EPA via the Corrective Measures Implementation/Remedial Design/Remedial Design Report/Remedial Action Work Plan (CMI/RD/RDR/RAWP) scheduled for December 22, 1998.

X. STATUTORY DETERMINATIONS

This interim action is protective of human health, and the environment and will reduce the principal threats posed by the CBRP. Relative to its overall effectiveness with respect to the nine selection criteria established by the NCP, the selected alternatives are cost effective. This interim action will not identify final remedial goals; but the selected interim alternatives are consistent with the interim remedial action objectives and any final action. Pursuant to the EPA IROD guidance (EPA 1989) and checklists, the alternative selection focused upon the key ARARs listed below which apply to the limited scope of the interim action. The alternative selection also considered final action ARARs to ensure the interim action and any final action is compatible. The final action will comply with Federal and State applicable or relevant and appropriate requirements. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is a furtherance of that statutory mandate.

Because this action does not constitute the final remedy for the CBRP, the statutory preference of remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to fully address the threats posed by the conditions at the CBRP. This interim action is not designed or expected to be a final action for the groundwater, but the selected remedy represents the best balance of tradeoffs among alternatives with respect of pertinent criteria, given the limited scope of the action. The soil cover will likely be acceptable for the final action for soils at the unit. The native soil cover will address low level threat wastes (i.e., low concentration dioxin contamination in the Pit Area soil and organic contamination in the deep soil). In-Situ Air Sparging with Soil Vapor Extraction will address principal threat wastes (i.e., highly concentrated TCE in the aquifer sediments immediately adjacent to the pit in the upper zone of the water table aquifer) and VOC vadose zone contamination.

- Fugitive Particulate Emissions (40 CFR 50.6 and SC R61-62.6, Section III)

- SC Toxic Air Pollutant regulations (SC R61-62.1, Section II, paragraph 3)

- SC Well Construction regulations (SC R61-71)

SCHWMR R.61-79.124 and Section 117(a) of CERCLA, as amended, require advertisement of the draft permit modification and the proposed plan, respectively. Because this is an interim remedial action, a permit modification is not required to be included with this IROD. A final permit modification will include the final selection of remedial alternatives under RCRA, will be sought for the entire CBRP OU with the final SB/PP and will include the necessary public involvement and regulatory approvals. This IROD also satisfies the RCRA requirements for an Interim Measures Work Plan.

XI. EXPLANATION OF SIGNIFICANT CHANGES

The IAPP provided forinvolvement with the community through a document review process and a public comment period from April 17, 1998 through May 16, 1998. The IAPP was presented to the SRS Citizens Advisory Board in an open public meeting which was advertised and held on May 6, 1998. Comments received during the 30-day public comment period and the May 6, 1998 public meeting are addressed in Appendix A of this IROD. No significant changes to the selected remedy resulted from public comments.

XII. RESPONSIVENESS SUMMARY

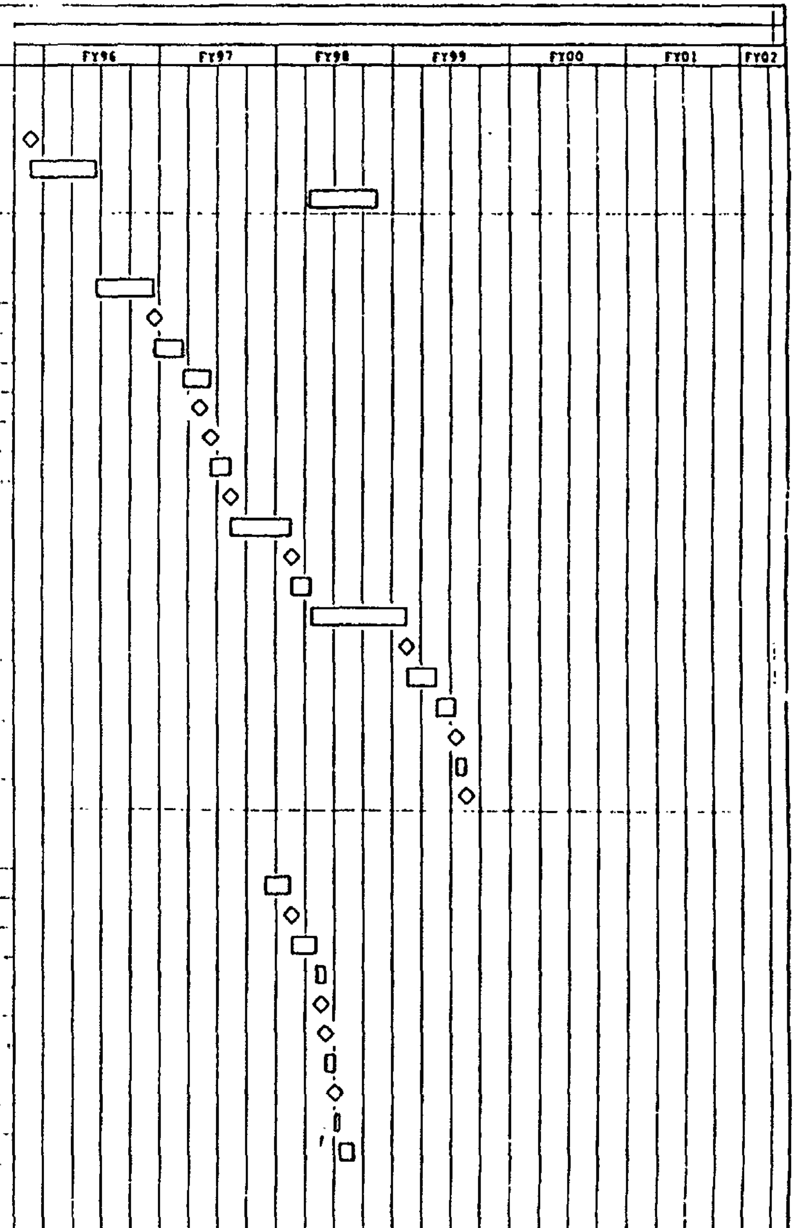
Comments received during the public comment period are discussed in the Responsiveness Summary (see Appendix A) of this IROD.

XIII. POST-IROD DOCUMENT SCHEDULE

An integrated interim and final action implementation schedule is illustrated in Figure 12. A signed IROD is scheduled for September 30, 1998. The interim CMI/RD/RDR/RAWP was submitted on June 19,1998. Construction of the interim action is scheduled to begin by January 22, 1999. A performance evaluation of the interim action will be prepared and submitted to EPA and SCDHEC by October 27, 2000.

Figure 12. Integrated Interim and Final Action Implementation Schedule

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
CHARACTERIZATION			
FIELD START	22AUG95		0
CHARACTERIZATION	22AUG95	18MAR96	143
GW CHARACTERIZATION SUPPORTING REV.1.2RFI/RI/BRA	12JAN98	14AUG98	151
RFI/RI/BRA REPORTS			
DEVELOP REV.0 RFI/RI/BRA	19MAR96	16SEP96	126
SRS SUBMITTAL OF REV.0 RFI/RI/BRA		16SEP96	0
EPA/SCDHEC REVIEW REV.0 RFI/RI/BRA	17SEP96	15DEC96	90
SRS INCORPORATE EPA/SCDHEC COMMENTS	16DEC96	10MAR97	85
RFI/RI/BRA COMM.RESOLUT.MTG.& CMS/FS SCOPING MTG		5FEB97	0
SRS SUBMITTAL OF REV.1 RFI/RI/BRA		10MAR97	0
EPA/SCDHEC REVIEW REV.1 RFI/RI/BRA	11MAR97	13MAY97	64
RECIEPT OF EPA/SCDHEC REV.1 COMMENTS		13MAY97	0
SRS INCORPORATE EPA/SCDHEC COMMENTS	14MAY97	19NOV97	190
SRS SUBMITTAL REV 1.1 RFI/RI/BRA		19NOV97	0
EPA/SCDHEC REVIEW OF REV.1.1 RFI/RI/BRA	20NOV97	19JAN98	60
SRS INCORPORATE COMMENTS & GW DATA FOR REV.1.2	20JAN98	16NOV98	210
SRS SUBMITTAL OF REV.1.2 RFI/RI/BRA		16NOV98	0
EPA/SCDHEC REVIEW OF REV.1.2 RFI/RI/BRA	17NOV98	15FEB99	91
SRS INCORPORATE COMMENTS FOR REV.1.3	16FEB99	16APR99	60
SRS SUBMITTAL OF REV.1.3 RFI/RI/BRA		16APR99	0
EPA/SCDHEC FINAL REVIEW OF REV.1.3 RFI/RI/BRA	19APR99	18MAY99	30
RECIEPT OF EPA/SCDHEC APPROVAL		18MAY99	0
INTERIM ACTION / PROPOSED PLAN			
DEVELOP INTERIM ACTION / PROPOSED PLAN (IAPP)	27AUG97	14NOV97	57
SRS SUBMITTAL OF REV. 0 IAPP		17NOV97	0
EPA/SCDHEC REVIEW REV.0 IAPP	18NOV97	2FEB98	76
SRS INCORPORATE COMMENTS / REV.1 IAPP	3FEB98	4MAR98	30
COMMENT RESOLUTION MEETING		18FEB98	0
SRS SUBMIT REV.1 IAPP		4MAR98	0
EPA/SCDHEC FINAL REVIEW & APPROVAL REV.1 IAPP	5MAR98	3APR98	30
RECIEPT OF EPA/SCDHEC APPROVAL REV.1 IAPP		3APR98	0
NOTIFICATION OF PUBLIC COMMENT	4APR98	17APR98	14
PUBLIC COMMENT PERIOD	18APR98	1JUN98	45



Plot Date 25FEB98
Data Date 13DEC93
Project Start 1DEC93
Project Finish 11JAN02

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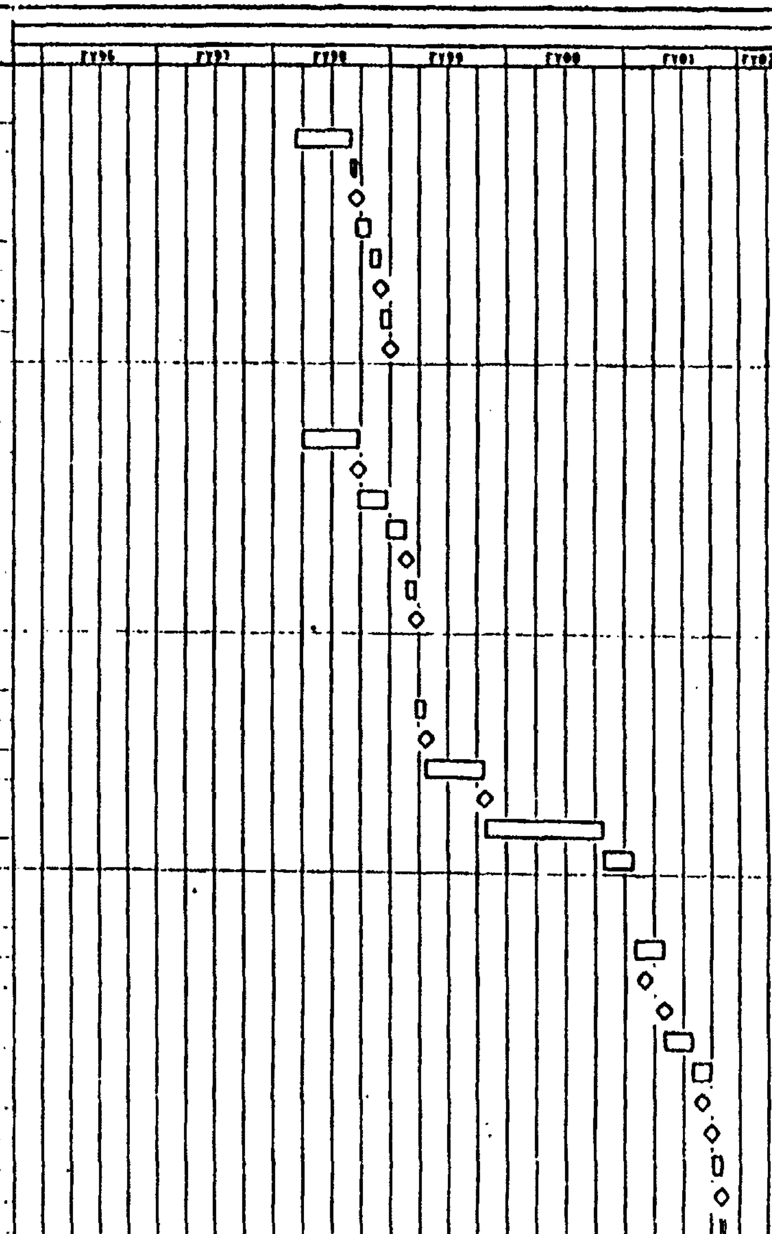
ENVIRONMENTAL RESTORATION
508/1218 C-AREA BRP (131-C)
INTEGRATED INTERIM&FINAL ACT IMP SCH

Rev. 7; 02/23/98

Date	Revision	Checked	Approved

Figure 12. Integrated Interim and Final Action Implementation Schedule

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
INTERIM RECORD OF DECISION			
DEVELOP INTERIM RECORD OF DECISION (IROD)	8DEC97	1JUN98	120
RESPONSIVENESS SUMMARY	2JUN98	15JUN98	14
SRS SUBMITTAL OF REV.0 IROD		15JUN98	0
EPA/SCDHEC REVIEW REV.0 IROD	16JUN98	30JUL98	45
SRS INCORPORATE COMMENTS / REV.1 IROD	31JUL98	29AUG98	30
SRS SUBMIT REV.1 IROD		31AUG98	0
EPA/SCDHEC FINAL REVIEW & APPROVAL REV.1 IROD	1SEP98	30SEP98	30
SRS SUBMIT SIGNED IROD TO EPA/SCDHEC		30SEP98	0
INTERIM ACTION CM/RD/RDR/RA WORKPLAN			
DEVELOP CM/RD/RDR/RA WORKPLAN	31DEC97	22JUN98	120
SRS SUBMITTAL OF REV.0 CM/RD/RDR/RA WORKPLAN		22JUN98	0
EPA/SCDHEC REVIEW REV 0 CM/RD/RDR/RA WORKPLAN	23JUN98	21SEP98	91
SRS INCORPORATE COMMENTS / REV.1 CM/RD/RDR/RA WP	22SEP98	20NOV98	60
SRS SUBMIT REV.1 CM/RD/RDR/RA WORKPLAN		20NOV98	0
EPA/SCDHEC FINL REV &APPRV REV.1 CM/RD/RDR/RA WP	23NOV98	22DEC98	30
RECIEPT OF CM/RD/RDR/RA WP APPRV FROM EPA/SCDHEC		22DEC98	0
CONSTRUCTION ACTIVITIES (INTERIM ACTION)			
CONSTRUCTION MOBILIZATION	23DEC98	21JAN99	30
CONSTRUCTION START		22JAN99	0
CONSTRUCTION ACTIVITIES	22JAN99	22JUL99	126
START UP OPERATIONS		23JUL99	0
SVE OPERATIONS	26JUL99	26JUL00	253
PERFORMANCE EVALUATION, PREPARATION & SUBMITTAL	27JUL00	27OCT00	66
CMS/FS/PP/DRAFT ROD			
DEVELOP CMS/FS/PP/DRAFT ROD	30OCT00	30JAN01	62
CMS/FS SCOPING MEETING		29NOV00	0
SRS SUBMITTAL OF REV. 0 CMS/FS/PP/DRAFT ROD		30JAN01	0
EPA/SCDHEC REVIEW	31JAN01	30APR01	90
SRS INCORPORATE EPA/SCDHEC COMMENTS	1MAY01	29JUN01	60
COMMENT RESOLUTION MEETING		30MAY01	0
SRS SUBMITTAL OF REV. 1 CMS/FS/PP		29JUN01	0
EPA/SCDHEC FINAL REVIEW & APPROVAL	2JUL01	31JUL01	30
RECEIPT OF EPA/SCDHEC APPROVAL		31JUL01	0
NOTIFICATION OF PUBLIC COMMENT	1AUG01	14AUG01	14



ENVIRONMENTAL RESTORATION
508/1218 C-AREA BRP (131-C)
INTEGRATED INTERIM&FINAL ACT IMP SCH

Rev. 1, 02/23/98

Project Start 1DEC93
Project Finish 31JAN02

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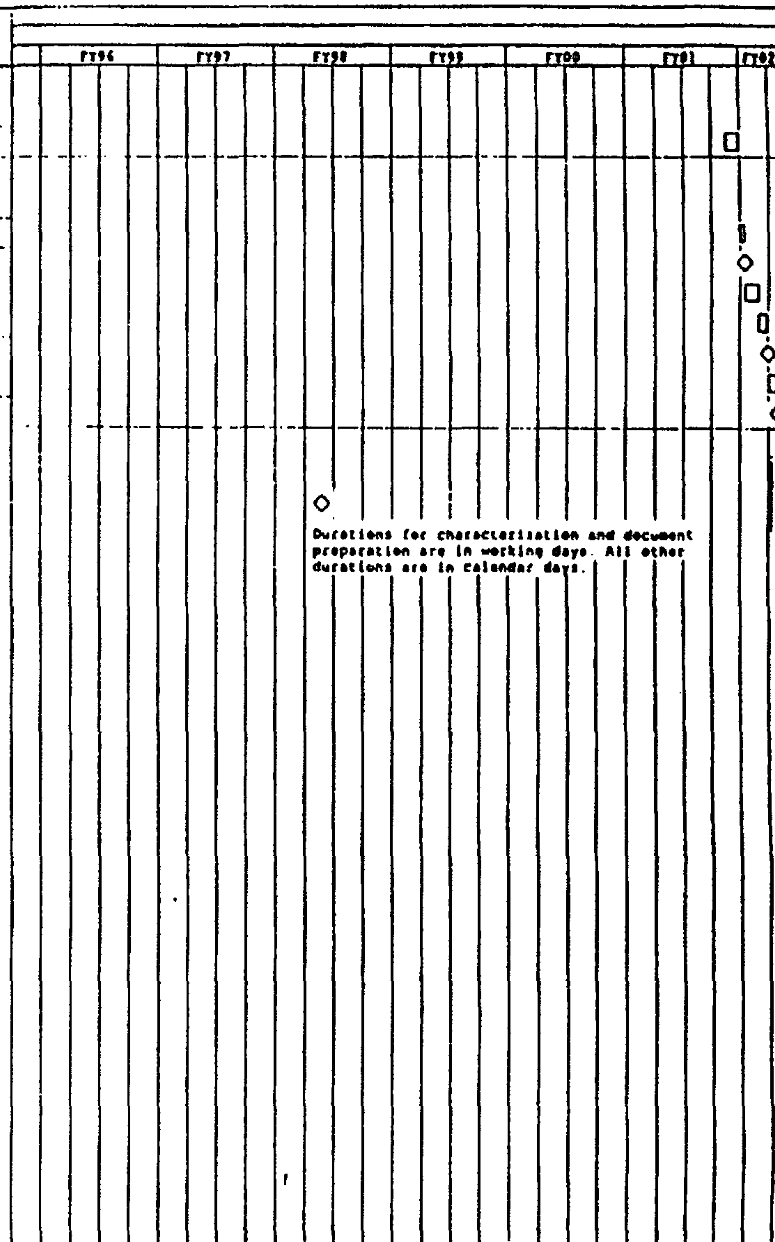
Figure 12. Integrated Interim and Final Action Implementation Schedule

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR
CMS/FS/PP/DRAFT ROD			
PUBLIC COMMENT PERIOD	15AUG01	28SEP01	45
RECORD OF DECISION			
RESPONSIVENESS SUMMARY & APPROVALS	1OCT01	14OCT01	14
SRS SUBMITTAL OF REV. 0 ROD		15OCT01	0
EPA/SCDHEC REVIEW	16OCT01	29NOV01	45
SRS INCORPORATES EPA/SCDHEC COMMENTS	30NOV01	29DEC01	30
SRS SUBMITTAL OF REV.1 ROD		31DEC01	0
EPA/SCDHEC FINAL REVIEW & APPROVAL	2JAN02	31JAN02	30
SUBMIT SIGNED ROD TO REGULATORS		31JAN02	0
FOOTNOTE			
	23FEB98		0



Plot Date	25FEB98
Data Date	13DEC93
Project Start	1DEC93
Project Finish	31JAN02

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ENVIRONMENTAL RESTORATION
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Rev. 1; 02/23/98

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[illegible]	[illegible]	[illegible]	[illegible]

Concurrent with the above interim action, a final action is scheduled. A detailed alternative screening process will be conducted for the final action in the CMS/FS. The CMS/FS will be scoped after the nature and extent of the plume is known and a performance evaluation has been completed on the Interim Action. A SB/PP will be submitted at the same time as the CMS/FS on January 30, 2001. Upon approval of the SB/PP, the public comment period will start and the final ROD will be submitted within 14 days after the completion of the public comment period.

XIV. REFERENCES

DOE 1994. *Public Involvement, A Plan for Savannah River Site,* Savannah River Operations Office, Aiken, South Carolina, 1994.

DOE 1996. *Savannah River Site Future Use Project Report Stakeholder Recommendations for SRS Land and Facilities (U)*, Savannah River Operations Office, Aiken, South Carolina, January 1996.

EPA (U.S. Environmental Protection Agency), 1989*Guidance on Preparing Superfund Decision Documents: The Proposed Plan. The Record of Decision, Explanation of Significant Differences. The Record of Decision Amendment.* EPA/540/G89/007, Office of Emergency and Remedial Response, Washington, DC (July).

EPA (U.S. Environmental Protection Agency), 1996*Final Guidance: Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERLA Sites.* Directive 9283.1-12, EPA 540/R-96/023, PB96-963508, Office of Solid Waste and Emergency Response, Washington, DC (October).

Federal Facility Agreement (FFA), 1993. Federal Facility Agreement for the Savannah River Site, Administrative Docket Number 89-05-FF, Effective Date: August 16, 1993, WSRC-OS-94-42

WSRC 1993. RFI/RI Program Plan

WSRC 1994. *Phase II RCRA Facility Investigation/Remedial Investigation Work Plan for the C-Area Burning Rubble Pit* (131-C). WSRC-RP-91-1122, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken SC.

WSRC 1995. *C-Area Burning Rubble Pit (131-C) Field Investigation Report (U).* WSRC-RP-96-310, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC. WSRC.

WSRC 1996. *Qualify Control Summary Report, C-Area Burning/Rubble Pit. Phase II Groundwater Sampling Events.* ESH-EMS-960003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC.

WSRC 1997a. RCRA *Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment for the C-Area Burning/Rubble Pit (U)*, (WSRC-RP-96-170) Revision 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina, 1997.

WSRC 1997b. *Data Summary Report for the C-Area Burning/Rubble Pit, Phase 2.* ESH-EMS-970020, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC.

WSRC 1997c. *Data Summary Report for the C-Area Burning/Rubble Pit, Phase 3.* ESH-EMS-970019, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC.

WSRC 1998a. *Interim Action Proposed Plan for the C-Area Burning/Rubble Pit Operable Unit (U)*, Rev. 1. 1, WSRC-RP-97-437 Westinghouse Savannah River Company, Savannah River Site, Aiken. South Carolina.

WSRC 1998b. *Phase II RFI/RI Work Plan for the CBRP Appendix K.* WSRC-RP-91-1122, Rev. 2.4 Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina.

APPENDIX A

RESPONSIVENESS SUMMARY

The 30-day public comment period for the CBRP IAPP began on April 17, 1998 and ended on May 16, 1998. The IAPP was also presented to the Citizens Advisory Board during the public comment period on May 6, 1998 at an open public meeting.

Comments from the Citizens Advisory Board Meeting

The following comments were taken from the May 6, 1998 Citizens Advisory Board meeting transcript. The following comments are paraphrased from the public meeting transcript during the presentation of the proposed remedy for this waste unit.

DOE presented the proposed Interim Action for the C-Area Burning/Rubble Pits. This presentation was requested by the Subcommittee in order to determine if the Subcommittee would pursue a motion. After the presentation, a suggestion was made for the use of horizontal wells; however, it was determined that because of the close proximity to the water table and the relatively small size of the hotspot, the horizontal well approach to remediating the site was not economically viable. A suggestion for the use of the Plug-in ROD approach to remediating the site was made. This suggestion was discussed but it was determined to not be consistent with the timing of this interim action. There was discussion on whether the Plug-in-ROD approach would be acceptable for other burning rubble pits, and it was decided that it could be useful if they were similar in nature and extent of contamination. Therefore, it appears the path forward will be that proposed in the presentation, which for soils is the use of a native soil cover and for the groundwater, In-Situ Air Sparging/SVE. In conclusion, the interim action objectives revolve around controlling solvent migration in the soils beneath the pit and the groundwater."

Comments from the audience at the Citizens Advisory Board Meeting (as recorded by SRS.)

Comment 1: Is tritium mixed within the VOC plume?

Response 1: Yes, but at low activities. Additional information was provided within the IAPP (WSRC 1998a) Section IV. A, page 6.

Comment 2: How much VOC is expected to be recovered and how long will it take?

Response 2: Recovery rates were not modeled, but one purpose of IAPP is to determine actual recovery rates to evaluate AS/SVE as a final remedial alternative.

Comment 3: Why is SRS concerned about tritium mixing with the VOC plume which would result from alternative GW-5?

Response 3: The operation of alternative GW-5's air stripper would result in significant tritium releases which would potentially pose unnecessary health risks to workers.

Comment 4: Why didn't we choose to dig up the contamination?

Response 4: Alternative S-5 considered digging up the top 4 feet, but at $785,400 versus the selected native soil cover (S-5) at $194,800, S-5 was prohibitively expensive. In addition, removal of the contaminated vadose zone soils is not a viable alternative because the depth of the excavation would have to be in excess of 60 feet and when safe slopes are considered the volume of soils ultimately removed would be very large.

Comment 5: Are operations and maintenance costs included in the estimates and for what period?

Response 5: They are included for the planned 5-year operations period.

Comment 6: Why are we doing an interim action?

Response 6: Per EPA guidance, on presumptive response strategies for groundwater (EPA, 1996), groundwater response actions should be implemented in a phased approach with provisions for monitoring and evaluating their performance. Consistent with this guidance, this interim action is proposed to remove high concentrations of TCE from a known source of VOC contamination which will assist in limiting the spread of contamination from the pit area to the down-gradient areas.